Pit and Quarry

Large Blast in a California Cement Quarry

THE above photograph illustrates the results of a successful blast at the quarry of the Monolith Cement Company at Monolith, California.

Over 250,000 tons of limestone were brought down and made available on the quarry floor.

Cordeau-Bickford, the safe and efficient detonating agent, was used and played an important part in the success of the shot.

CORDEAU-
DETONATING FUSE
BICKFORD

ENSIGN-BICKFORD COMPANY

Simsbury Connecticut

The Mayhugh Trucking Company, Los Angeles, California, owns this fleet of 15 St.Paul Hydraulic Hoist equipped International Trucks. Bodies designed and built by the Standard Auto Body Wks., Los Angeles.

Close-up view of a St.Paul Hoist on an International Model 43

Dump Truck Wisdom

Claude Mayhugh, owner of Mayhugh Trucking Co., 2409 Third Ave., Los Angeles, has 18 St.Paul Hydraulic Hoist equipped dump trucks. After selecting his trucks, he says—

"The second best bet is the St.Paul Hoist. I don't say the St.Paul is the best hoist in the world, but it's the best I've ever used. I think it is fully 100% faster than any I have ever handled, and the upkeep is remarkably small.

"On the 63s I have had three St.Pauls for thirty months. They have never been out of commission and it has cost me just six dollars all told for repairs. That's fair enough, isn't it? I had two trucks on one job where I had a St.Paul and the truck I had rented had another hoist. Mine would get in, unload and back out while the other fellow was merely getting in the air."

Speed Up Your Truck With a St.Paul Hoist

Hydraulic Hoist Manufacturing Co.

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VERTICAL AND UNDERBODY

HYDRAULIC HOISTS

Pit and Quarry

Published Every Other Wednesday for Producers and Manufacturers of Sand Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.

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S. E. COLE, Eastern Representative
90 West Street, New York
Ph. Rector 1166
L. M. WEISS, Southern Representative
805 Gerke Bldg., Cincinnati

HAROLD W. MUNDAY, Editor
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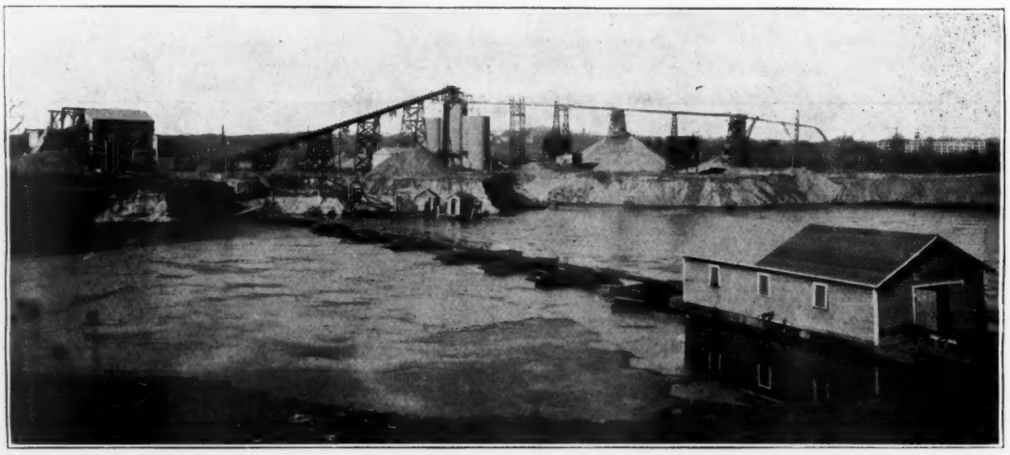
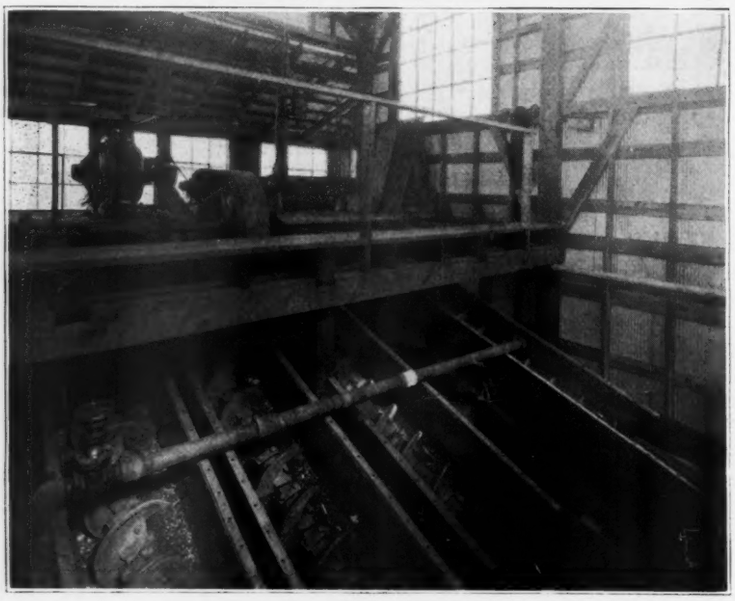
A MODEL PLANT





THE Des Moines Sand and Fuel Company's new plant, Des Moines, Iowa, has aroused a great deal of interest through its highly efficient design.

Among the units which contribute largely to this plant's efficiency is a battery of four Eagle Sand and Gravel Washers. The gravel as taken from the artificial lake is cluttered with sticks and trash as well as coal, when it arrives at the plant. But after passing thru the Eagle Washers it has no difficulty in passing any inspection test, in fact Des Moines Sand products have gained a very enviable reputation, a big factor in the volume of business they secure in a highly competitive field.

Mr. Gaylord Gray, General Manager, in speaking of the Eagle Washers, says the best thing he can say about them is that after testing two in the old plant the specifications for the new called for the battery of four.

The Eagle soon pays for itself. Let us tell you more about it. Write Dept. K.

EAGLE IRON WORKS

Established 1872

DES MOINES, U. S. A.

Pit and Quarry

Vol. 12 CHICAGO, ILL., SEPTEMBER 29, 1926 No. 13

THE ORGANIZATION, PLAN AND PURPOSE OF THE ALL WESTERN ROAD SHOW

THE All- Western Road Show received its inspiration from the National Good Roads Show and Convention held each year in the Middle West. The national affair, usually held in January at Chicago, draws heavily from the East and Middle West and is a very successful institution for good among road builders in the East. The National Good Roads Show will be held in Chicago from January 10th through the 14th and is discussed elsewhere in this issue.

The attendance from the West, however, has always been negligible and last year it was decided to invite Western road builders to San Francisco to meet in convention to discuss their own peculiar problems and view an exhibition of machinery and equipment the size of which has never been equalled. All groups of road builders in the West accordingly called conventions, and meetings were held of the following organizations: Western Association of State Highway Officials; Western States County Officials Association; Pacific Sand and Gravel Association; Western Contractors (informally) and the Federal Aid Organization; and the Western Road Association, which did excellent work in coordinating Western sentiment in Washington during the recent passage of the Dowell Bill for the extension of Federal Aid.

By common request another All-Western Road Show was called for this year, the dates being October 7 to 15 inclusive. Last year's show will be improved upon and thousands from the eleven Western states are expected to take this opportunity to meet their fellow road builders and learn much of value in the administration of their construction work. The show will be enlarged in scope to include equipment of interest to building contractors and thus be of additional value to many of the visitors. Many exhibits will be shown under power and the demonstration field on the show grounds will be filled with various types of plants installed and in operation. The Caterpillar Tractor Company of San Leandro, California, will have a number of types of caterpillars available for operating various equipment on the demonstration field and show grounds. This phase last year proved one of the most interesting of the entire show; hundreds of visitors were constantly on the demonstration field watching the equipment in actual operation.

The show is held without financial profit to anybody, being financed by the sale of space to manufacturers. A flat charge of 30 cents per square foot is made for any position in the tents. This price includes dividing railings, one sign and police watchmen service. Money in excess of the actual expenses is returned to exhibitors and the entire movement is characterized by an unselfish desire to provide a vehicle for the advancement and progress of highway and allied construction in the Western territory. After last year's show approximately $11,000 was pro-rated back to exhibitors.

Admission to the show is free. Summer railroad rates are in effect affording reduced fare from all points. Mr. P. H. Curtis, Secretary of the All-Western Road Show, 625 Market Street, San Francisco, will reserve hotel accommodations upon request. An information bureau will be located at the Administration office on the show grounds where mail may be called for and forwarded. Western Union and public stenographer will be conveniently located near the entrance. Janitor service will be furnished and all booths, aisles, and grounds will be kept clean by the Show management.

Everyone attending the Show must register, for which there is no charge. The only requirement of the Show is that each person must register and wear a badge when on the grounds. Exhibitors and attaches will wear a special badge. A telephone will be installed in any booth for the sum of $10, a switchboard being maintained by the Show management to connect with all stations, and incoming and inter-tent calls will be handled gratis. A record of outgoing calls will be kept by the switchboard operator and a memorandum handed to each station of the charges for out-going calls at 5 cents per call, or at prevailing tariff for long distance calls. Pay stations will also be located at the Administration office. Motion picture machines may be operated inside the exhibit tents, providing the standard slow-burning film is used.

The Belt Line Railroad operated by the Califor-

nia State Harbor Commission along the water front will have a special unloading and loading platform at the grounds where the Thomas Drayage and Rigging Company will have suitable equipment to unload all shipments and spot it in the proper position in the exhibition tents.

Rates for this service are as follows. Everything under its own power with own operator will be charged $1.50 per ton for unloading from cars and moving to space allotted, removing from the grounds, securing and loading on cars, $2.00 per ton, exhibitors in each case to furnish power necessary and operator.

All other machinery and equipment, will be unloaded from cars and moved to the space allotted for the sum of $2.00 per ton; removing, securing and loading on cars $2.50 per ton. An extra charge will be made in all cases for assembling and dismantling; this charge being based on the rate of $1.50 per hour for man and tools. Exhibitors may do their own hauling, but must arrange with the general supervisor for the time of arrival of trucks in order to avoid confusion and delay on the grounds.

As many exhibits in the tents will operate under gasoline power, special pipes have been provided which carry the exhaust gas into the open air or into cans half filled with water. This is a very desirable feature as machines in operation are more interesting than those not in motion.

A tentative program for the many conventions to be held coincidental with the show has been arranged. Changes may possibly be made in this schedule but it is believed that it will prevail, at least in the main. The show will open Thursday, October 7, with reception and registration of visitors. Friday, October 8, will be known as "Dealers' Day" and will be featured by a get-acquainted dinner with dance in the evening. Saturday, October 9, has been designated as Educational Day. Delegations from the engineering departments of various universities and preparatory schools will attend the show on that day, and guides will explain the operation of the various devices on display. Sunday, October 10, the show will be opened to the general public of San Francisco. On this date special ceremonies, to be participated in by the city, county and state officials will be held, devoted chiefly to education of the general public as to the value and desirability of more and better highways. The Western Association of State Highway officials will hold its annual meeting on Monday, October 11, when highway engineers and commissioners from the various states will meet to discuss their mutual problems. Tuesday, October 12, will be devoted to the annual convention of the Western County Officials' Association, an organization of county supervisors and commissioners formed at the last Western Show held in November, 1925. Contractors and engineers will meet in convention on Wednesday, October 13, the annual banquet of the show week being held in the evening. Thursday, October 14, will be designated as Rock Products day and given over for meetings to quarry operators and sand and gravel producers. The show will close with a grand climax on Friday, October 15.

SHORTAGE OF EXECUTIVES COMING

There are approximately 300,000 large and small manufacturers in the United States. Accurately compiled statistics reveal the startling fact that less than one half of all these companies ever make one per cent in profit, and that less than 10 per cent of them know what are their actual production costs. As long ago as October of last year the National Industrial Conference Board predicted a shortage of between 150,000 and 200,000 trained industrial executives by the year 1930. This report further stated that in that time there will be less than 50,000 men who will have received sufficient training to enable them to capably take over the management of the various industrial properties.

Is not this production already meeting with fulfillment if only by reason of the large number of merges that have been consummated during the past year? To entertain the combination of companies is not necessarily an indictment on the management being absorbed but it must be self-evident that the company which is making a good profit and which has a healthy prospective future is less willing and likely to merge with another company (except as the dominant party to the combination) than the "weak sisters" who might welcome such combination in the interest of their own dividends.

The large number of industrial merges that have been completed during the present year is perhaps the most notable feature of recent industrial history. On every side and in every field both large and small combinations have been effected. More are planned, so that this general trend may be expected to continue throughout the ensuing year. In such mergers, one president, one secretary, one sales manager, one board of directors, and so forth, take the place of two. While this process results in a direct saving to the combined companies, it simultaneously imposes upon the individuals a much heavier responsibility. Because of this trend there are new opportunities for men endowed with the vision and capacity to success fully pilot these enlarged undertakings.

NOTES CONCERNING SEVERAL CEMENT PLANTS ON THE PACIFIC COAST

By H. W. Munday

MODERN cement manufacture began on the Pacific Coast with the construction of a plant in 1898 at Colton, California, about fifty miles east of Los Angeles with an initial daily capacity of 500 barrels. The second plant in California was constructed at Cement, California, about half way between San Francisco and Sacramento in 1902 with an initial daily capacity of 1,600 barrels. At the present time there are a dozen active cement plants in the State and others either under construction or being financed. The total production of cement in California in 1902 was 171,000 barrels. Today, more than 1,000,000 barrels are produced a month.

The first cement plant constructed and operated in Oregon was in the year 1915 at Oswego, seven miles from Portland with a daily capacity of 1,100 barrels. There are today three active plants in Oregon. The first cement plant constructed in the State of Washington was in 1906 with a daily capacity of 1,200 barrels. Today there are four active plants in the State and a fifth in process of organization.

Practically all of these plants have been discussed in past issues of Pit and Quarry. There are some new developments which have not been mentioned before and some interesting details which can be presented for the first time.

Old Mission Portland Cement Company a Progressive Factor in California

Civilization on the Pacific Coast dates back to the "Missions" established by the old Padres. These monuments of pioneering zeal are still in existence to a large extent, shrines for tourists and an inspiration for the trail blazing spirit that has built up the Pacific Coast. One of the most picturesque Missions is that of San Juan Baptista. Here extremes meet. The village clustered around the old Mission apparently has been but slightly touched by the march of time. But within a short distance the spirit of progress has been humming night and day—at the plant of the Old Mission Portland Cement Company, one of the most enterprising firms in the Western building world. This is the original Wet Process Portland Cement Plant in Central California, which has set a mercilessly strict standard of excellence for its cement that is a credit to the industry.

About a year ago the Old Mission Portland Cement Company again demonstrated its spirit of progressiveness by launching on the market its newest product, Old Mission plastik watertite portland cement, fulfilling the dream of the industry about concrete of inherent impermeability and workability heretofore considered unattainable. These qualities are achieved in Old Mission plastik watertite without the use of admixtures of any

The Old Mission Portland Cement Plant

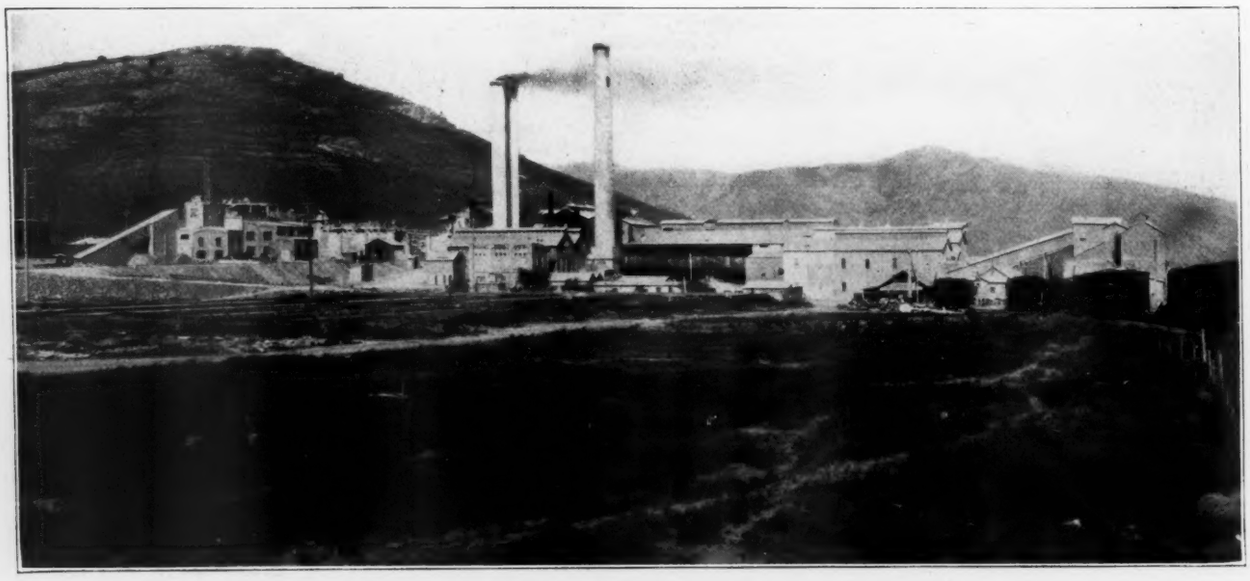
kind (other than the customary aggregates). The flowability of this new cement has also set new standards. It readily fills the most intricate reinforced forms, needs practically no spading or tamping, and does not stick to the chutes or forms. When the latter are removed, there is no patchwork to be done, no expense of after-treatment; and yet all the edges and corners are sharp and clear. One of the most note-worthy features about Old Mission plastik watertite portland cement is its increased bulkage. It yields more yardage per sack than the old style cement. By reason of this "increment" and its labor-saving workability, Old Mission plastik watertite means better concrete at lower cost.

In line with the rapid increase in the demand for its output, the Old Mission Portland Cement Company is now planning to invest almost a million dollars in plant extensions. Among these is a 6 mile aerial cable-way for bringing raw material to their mill. Naturally the products of the Old Mission Portland Cement Company are being extensively used in a multitude of important private and public construction projects. Among these, in San Francisco, are the Standard Oil Building, one of the tallest sky-scrapers; the San Francisco Federal Reserve Bank; the Commercial Union building, another mammoth office building; the Steinhart Aquarium; the famous Palace of the Legion of Honor, overlooking picturesque Golden Gate, the entrance to San Francisco's magnificent harbor; and the Esplanade of the Beach.

"Old Mission" has been specified for a new undertaking of vital importance to San Francisco—the Duboce Tunnel. Cutting through a barrier of hills, it will open a vast new section for the construction of homes. The Duboce Tunnel is almost a mile long and the cost is one and a quarter million dollars. Some of the projects in other parts of California embodying Old Mission Portland Cement, include engineering landmarks of national and international fame. For instance, the Stadium of the University of California at Berkeley rivals the famous Yale Bowl in seating capacity. The Don Pedro Dam opened up a vast acreage for intensive agriculture through irrigation. The Pitt River No. 3 Hydroelectric Unit of the Pacific Gas and Electric Company has harnessed immense water power. The Shredded Wheat Building at Oakland is the tallest reinforced concrete building west of Chicago. The Encinal Terminals, Alameda, owned by the Alaska Packers Association, are the largest of their kind west of New York.

Old Mission portland cement has been used on much road work, also for a great variety of purposes by all branches of the government—federal, state and municipal. This includes the largest municipal water system in the world, the Hetch Hetchy project with an estimated capacity of 400 million gallons of pure mountain water daily and 200,000 hydro-electric horse-power. The entire Hetch Hetchy Valley has been converted into a reservoir through the O'Shaughnessy Dam, 216¼ feet high. It is named after the chief engineer of San Francisco, the designer and chief executive of this construction project. At the present writing the Old Mission portland cement is also helping to make engineering history on the construction of what is known as the Oakland Estuary Tube, the largest Subaqueous Tube in the world. Its outside diameter is 37 feet. That of the Holland Tube under the Hudson River is 29.6 feet; that of the Rothersite Tunnel under the Thames is 30 feet.

But the unique distinction of this public enterprise is the construction method employed. Ever hear of a tunnel being built like a ship and used like a ship before assuming its final position in the finished work? Twelve huge sections of this tube are being built with pre-cast, reinforced concrete slabs at the Hunter's Point Dry Dock of the



The Monolith Portland Cement Plant

Bethlehem Shipbuilding Company. Each section, properly bulk-headed and water-proofed will be floated across San Francisco Bay to its Eastern shore and sunk into position. Each section is about 203 feet long, 37 feet outside diameter, will weigh 4,500 tons, and contains 232 tons of reinforcing steel and stirrups, or over a ton per foot linear measure. This unusual amount of reinforcing calls for "exacting" cement standards in order to produce a dense concrete, as tamping is impossible.

The mention of these great works in which Old Mission has had its part, gives an indication of the tremendous volume of construction that is going on in California, volume which represents healthy unforced growth to meet the needs of ever increasing population and expanding industry. The construction industries in this state are in a sound position. In addition to residential building, there are numerous new highway, power project, railroad, municipal, irrigation and water supply system operations. This great activity rests upon a solid basis in general economic conditions in the state. Every authority agrees that the long term prospect in California is unsurpassed, with the vast resources of the state being energetically but prudently developed in response to the needs of growing population. As for current conditions, excellent harvests, high level of employment, high general purchasing power, are foundations for sustained business and industrial progress.

The cement industry in California has been thriving with the construction industries. Demand for cement has absorbed supply, and the advent of new plants in the market has brought, as yet, no serious alarm of overproduction. The cement industry in this state has every prospect for continued prosperity.

Monolith Portland Cement Company Establishes Blasting Records

Blasting up mountains to obtain more material for Los Angeles buildings is something of a habit up at the little cement town of Monolith, California, perched on the edge of the Mojave Desert in the Tehachapis. Several hundred automobile loads of sightseers made the trip from Los Angeles to the quarry of the Monolith Portland Cement Company on Sunday, May 9, 1926, to witness the largest single shot ever made in a California cement quarry. One hundred and twelve thousand pounds of dynamite brought down 250,000 tons of limestone, and it was all deposited on the quarry floor making the entire yield available. The ledge of mountain broken off by the blast was about 500 feet across the base and more than 200 feet in height.

Three months were required in drilling for the coyote tunnel shooting and two weeks were re-

Before the Big Blast at Monolith

quired to place the dynamite. Both standard electric wiring and Cordeau Bickford fuse were used. So skillfully were the blasting details arranged, that in less than an hour after the explosion steam shovels mounted on caterpillar tractors were rolled into place and were busy loading the broken rock into quarry cars which were hauled to a 48x60 Traylor jaw crusher, which is now in operation, without any secondary shooting.

Another interesting incident at the Monolith Portland Cement Company's plant had to do with a motor. The Company has a Westinghouse sealed sleeve bearing motor driving a six inch Wilfley centrifugal pump handling slurry before it enters the dry kiln process. For no apparent reason an auto starter kicked out from overhead. Upon investigation it was found that the pump had blown out a gasket, but the motor had continued to operate. As a result the pit was filled with slurry and the motor was buried with only a portion of the eyebolt showing. The pit was immediately emptied and the motor washed with hose and water. Without changing oil the motor was started and has continued running.

Within the last two and a half years the plant of the Monolith Portland Cement Company has been practically rebuilt. The plant has changed from dry to the wet process in its raw grinding and has a capacity of 4,500 barrels of cement in twenty-four hours. The new plant is composed of concrete buildings for the proportioning and raw grinding. The proportioning structure is 32 feet wide, 68 feet long and 60 feet high; the raw grinding building is 70 feet wide, 90 feet long and 60 feet high. There are two mixing and eight slurry tanks for receiving the material from the compeb mills.

The quarry, which is two miles distant, is connected with the plant by a 36 inch gauge railroad over which steam locomotives haul ten-ton cars. A 1,500 foot cut along the western slope of Jamison Mountain constitutes the quarry floor with a vertical face of from 60 to 110 feet in extent. Drill holes are driven vertically from the tops of 20 foot benches and about 3,000 tons of rock are brought down at a time. The rock is loaded into 5½ yard dump cars by three steam shovels. Two of these shovels are Marions and one is an Erie. All three

After the Big Blast At Monolith

are mounted on caterpillar trucks. The 5½ yard cars are drawn in six car trains by a Plymouth gasoline locomotive over 2,000 feet of track to the receiving hopper of the crushing plant. A Sullivan air compressor, driven by a 100 h.p. motor supplies compressed air for Cochise rock drills at the quarry.

The rock is dumped from 5½ yard cars into a hopper and is passed by a Stephens-Adamson apron pan feeder to a Williams Mammoth crusher. This crusher has a maximum feed of 52 by 72 inches and reduces the rock to 1½ inches and finer in one operation. The crusher is driven by a General Electric 300 h.p., 220 volt motor, direct connected to the crusher shaft by a flexible coupling. The motor speed is 720 r.p.m. The apron feeder is driven by belt from a countershaft belted to the crusher motor. This feeder is operated by the man in charge of the crusher feed.

The material passing the Williams crusher passes by gravity to a belt conveyor, 24 inches wide, 150 feet between centers, which delivers it to the loading bin, 16 feet wide, 40 feet long, and 25 feet high, which is divided into three compartments. Two of these compartments are filled with crushed rock from the main conveyor, and the third is filled by a cross conveyor which can divert the load of the main conveyor. The 10 ton dump cars are loaded from the bin through two gate controlled chutes from the compartments. Ten cars are hauled each trip by a Vulcan locomotive.

The clay required is situated at a distance reached by a 1½ mile track branching off from the quarry railroad. The plant consists of a gasoline engine and a double drum hoist operating a dragline excavator from a central mast. The dragline scoops up clay to a depth of from 5 to 7 feet and dumps to a loading hopper. Clay is hauled to the mill in 10 ton double dump cars by a Plymouth geared locomotive.

A Roberts and Schaffer revolving car dumper operated by compressed air is used in unloading the 10 ton cars at the plant. The material is dumped into a 50 ton hopper which feeds it through a pan conveyor to a belt conveyor 24 inches wide and 150 feet between centers. This belt conveyor delivers the rock to open storage. It handles the clay also discharging onto a second conveyor which delivers to a clay storage. Both the stone and clay are reclaimed by tunnel belt conveyors. The crushed limestone is passed from storage through chutes to one tunnel and the clay is passed to another. Both tunnels are of concrete construction.

The limestone passing through the tunnel conveyor is discharged to an inclined bucket elevator 54 feet centers which in turn discharges to the rock storage bins of 150 ton capacity in the proportioning building. The clay passing through the tunnel conveyor is discharged to a second bucket elevator which in turn discharges to a clay storage bin also of 150 tons capacity. The limestone and clay are fed from the hopper to Schaffer poidometers for the correct proportioning. The mixture is discharged into a 24 inch inclined bucket elevator that delivers to an apron feeder which in turn delivers to a Shuttle conveyor 24 inches wide and 40 feet long. This conveyor distributes the material to four storage bins which are each over a compeb mill. These Worthington compeb mills are each 26 feet long and 7 feet in diameter. Each mill is driven by a 500 h.p. General Electric synchronous motor.

The discharge from the compeb mills is passed to two concrete mixing tanks each 16 feet in diameter and 12 feet deep. A Dorr system of agitation keeps this material in motion. Compressed air and mechanical agitators are used. The mixture is drawn from these tanks and discharged by bucket elevators into six concrete slurry tanks each 20 feet in diameter and 24 feet high. These slurry tanks are also equipped with the Dorr system for agitation. The slurry from these tanks may be passed directly into the kilns or may be discharged to storage tanks back of the kilns.

A battery of four oil fired kilns is used. Three of these are 7½ by 9½ by 200 feet and the fourth is a Traylor 10 by 11 by 200 feet. The Traylor kiln is rotated by a 125 h.p. variable speed motor while the other three are operated by 75 h.p. motors. The Traylor is on a slope of ⅜ inches to the foot while the other three are on a slope of ½ inch to the foot. These kilns are served by two Weber concrete stacks each 180 feet high and 11 feet in diameter. The clinker is discharged from the kilns to a drag chain conveyor which delivers the clinker to a 24 inch pivot bucket conveyor which discharge to the clinker storage. The return of this bucket conveyor is through a tunnel and the clinker is reclaimed from storage on the return and delivered to an 18 inch inclined bucket elevator that discharges at a height of 67 feet to storage. The gypsum storage is alongside this clinker storage and the gypsum is handled by a 28 foot span electrical traveling crane with a ¾ yard clamshell bucket. Two Schaffer poidometers below these bins proportion the clinker and gypsum.

The gypsum and clinker mixture is passed to a bucket elevator which discharges at a height of 54 feet either to compeb mills, hoppers or to a shuttle conveyor and then to the ball mill bins. A battery of five ball mills, four number 8 Krupps and one number 8 Gates do the grinding. The discharge from the ball mills is delivered by screw conveyor and bucket elevator to storage bins from which the material is fed to the tube mills for final grinding. There are ten tube mills, seven 6 x 16 feet Krupps, two 5¼ x 20 foot Gates and one 8 x 16 foot Gates. The product of the compeb and tube mills are carried by two 24 inch belt conveyors each 130 feet between centers to the stockhouse. The storage capacity of the stockhouse is 250,000 barrels. The finished cement is reclaimed from this storage by screw conveyors and delivered to the packing de-

partment where two Bates packers sack the material.

Yosemite Portland Cement Company Breaks Ground for New Plant

The Yosemite Portland Cement Company has awarded the contract for the machinery for the new cement plant at Merced, California, to Allis-Chalmers. The preliminary work at the mill site is to start at once.

The equipment will include two kilns each 240 feet long and 10 feet in diameter, two wet grinding mills 7 feet in diameter and 27 feet in length and two clinker grinding mills of the same size. The plant will have a capacity of 2,500 barrels per day. The plant is expected to be ready for production in the spring of 1927.

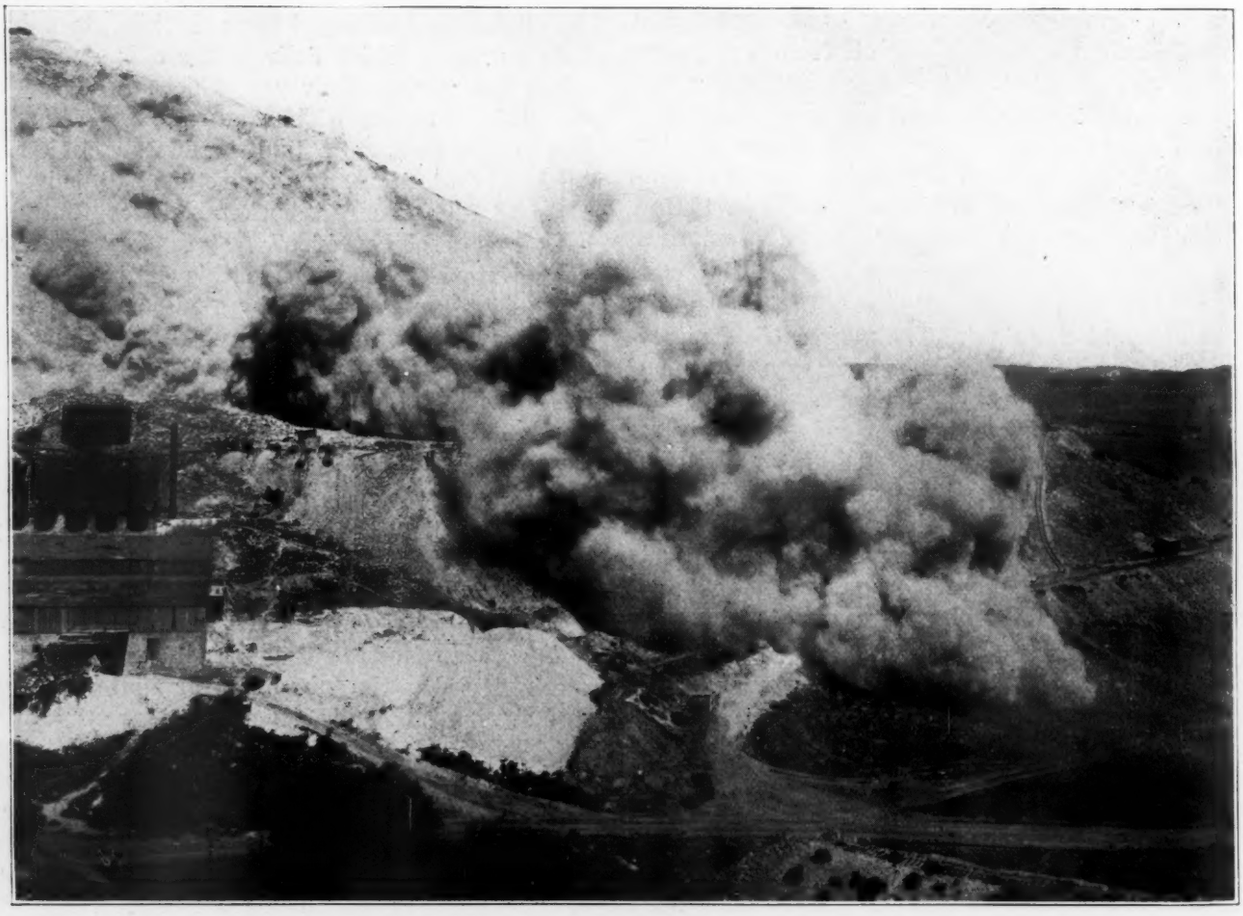
Calaveras Cement Company Completes Thoroughly Modern Plant

Calaveras County, California, which has in days past seen $153,780,000 in gold taken from her streams and mines, is now entering a new era of development. The limestone and shale deposits within her borders have been found, after extensive investigations, to be particularly suited for the manufacture of a high-grade portland cement. The Calaveras Cement Company has just completed one of the finest and most up-to-date mills in the world near San Andreas, the county seat.

To bring about the construction of this plant, it was necessary for the Southern Pacific Railway to extend its lines several miles up into the foothill country. Together with the cement company's tracks a total of twelve miles of new track was built to connnect the old terminus of the railroad to the plant site. The quarries are so located that limestone and shale are transported to the mill on an easy down grade, a distance of approximately half a mile.

Limestone in the quarry is loaded with a Bucyrus model 60, electric drive, caterpillar shovel equipped with a 2½ yard dipper. Quarry drilling is accomplished by means of an Armstrong churn-drill with electric drive, four Cochise air-hammers, and one Ingersoll-Rand jackhammer. Shale is handled with a Bucyrus model 14-B steam-shovel mounted on caterpillars. Twenty ton solid body cars are used, and two 19-ton Plymouth gasoline locomotives handle the rock trains with ease on the short haul to the plant.

A Western rotary car dumper is used to tip the cars into a number 21 Superior Allis-Chalmers 42 inch crusher having a capacity of 500 tons of limestone per hour. The crusher discharges on a 36 inch Jeffrey belt-conveyor 210 feet long, inclined at 15 degrees, which elevates the rock to a surge



One Hundred and Twelve Thousand Pounds of Dynamite Released at Monolith

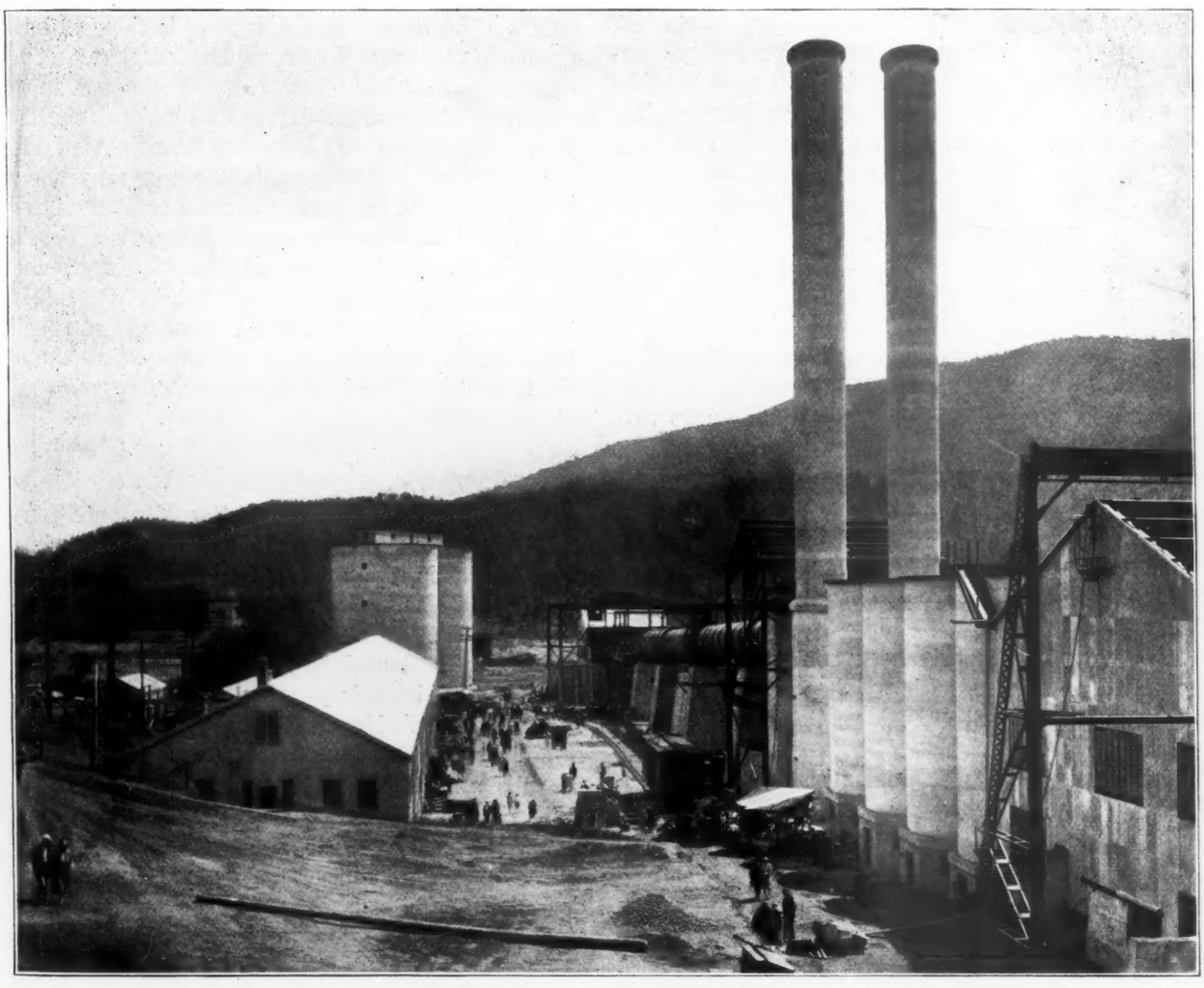
bin over the secondary crusher. This, a number 10 Superior crusher, with 110 tons per hour capacity, reduces the rock to one inch and smaller.

Rock and shale are handled in the storage with a Milwaukee 80 foot traveling crane, driven by three 50 h.p. and one 10 h.p. motors, and equipped with a 3 yard Hayward clamshell bucket. The storage has sufficient capacity to make 26,000 barrels of cement. Rock and shale are deposited from the storage direct into the compeb mill-bins in the proper proportion by this crane. Two special Allis-Chalmers compeb mills, 26 feet long, 8 feet diameter on the preliminary end, 7 feet on the finishing end, reduce the material to 90 per cent through a 200 mesh sieve.

The mills are driven by 500 h.p., 2300 volt, Allis-Chalmers synchronous motors working through Cutler Hammer magnetic clutches. Sufficient limestone and shale to produce 75 barrels of cement are ground through each of these mills per hour. The slurry, containing 32 per cent moisture, is pumped from the raw mills to the storage silos by an Allis-Chalmers air-operated slurry pump.

One of the best features of this plant is the slurry-handling equipment, consisting of eight 20x40 feet concrete, cone bottomed, slurry silos with basement underneath. Agitation of the slurry is accomplished by the introduction of air as it is pushed through special connections at the bottom of the cones. Three pipe-lines enter each silo, and they are so connected that slurry may be moved from one silo to another either by gravity or by a second slurry pump. It may also be circulated and agitated in the same tank by means of this pump. From these silos the slurry flows by gravity to the corrected slurry tanks under the kilns which are equipped with Dorr slurry mixers. From these tanks, the slurry is carried to the kiln feeding devices by two 4 inch Wilfley centrifugal pumps. All the pumps are piped together so that they may be used interchangeably. Merco Nordstrom lubricated plug valves obviate any difficulties from leaky or broken valves.

The two kilns are 10 feet by 11 feet 3 inches by 240 feet mounted on four supporting trunions each, and driven by variable speed motors. The kiln feeding mechanism is also driven by variable speed motors, so synchronized with the kiln drive that the feed is regulated to the speed of the kiln without attention from the operator. Water-jacketed feed pipes are provided. Draft is secured by two concrete stacks, 9 feet internal diameter, by 175



The Calaveras Portland Cement Plant

feet high. The concrete flues leading to the stack and 75 feet of the stack height are insulated with fire brick. The rated capacity of the kilns is 1,800 barrels each per day.

Two 8 feet by 71 feet 6 inch coolers, mounted on two trunnions each and provided with lifters, cool the clinkers and discharge into the storage which has a capacity of 38,000 barrels of clinker. This storage is served by an electric traveling crane, an exact duplicate of the crane used for the raw material. Clinker and gypsum are distributed in the storage and placed in their respective bins by this crane.

The two finish grinding compeb mills, 8 by 24 feet are driven by 650 h.p., 2300 volt, Allis-Chalmers synchronous motors. Feeding of these mills is done with table feeders for clinker, and a ratchet and screw conveyor device for gypsum. The cement is carried by a cross conveyor to either of two Fuller-Kinyon cement pumps which elevate and distribute it to any of the five 800 feet concrete silos. Capacity of storage is 68,000 barrels.

Cement is recovered from the silos by four screw conveyors discharging into a cross conveyor which elevates to the packing machine bins. Two Bates 3-spout bag packing machines are provided. The bag house is adjacent to the packing department, and all facilities for cleaning, sorting, tying, etc., are provided. Dust is removed from the packing department by Sly dust arresters. These Sly dust arresters were installed about six months ago. The equipment consists of a dust arrester 13 feet long, the necessary support and an exhaust fan.

Power for this plant is provided by the Pacific Gas and Electric Company which has built and maintains a fine substation at the plant, stepping the current down from 60,000 volts to 2,300 volts for the company's transformers. There is also an auxiliary 17,000 volt power line connected to a substation for use in emergency.

Water is pumped by a three-plunger pump to a 150,000 gallon tank on a nearby hill from the San Antone and Calaveras creeks, and distributed from there to the plant and quarry. Compressed air is supplied by a 1,300 cubic feet free air Ingersoll-Rand compressor to the jackhammers, slurry pumps, Fuller-Kinyon system, drill sharpeners, etc.

Safety work has early been emphasized by this company, and all machinery has been carefully guarded under expert direction. One of the earliest buildings of the plant was a large one which houses the car repair shops, machine and blacksmith shops, electrician's shop, carpenter shop, store room, office and laboratory, air compressor, transformers and switchboards. All equipment is direct driven through gear reducers.

Chiefly responsible for the success of this enterprise are men well known in the mining and cement world; William Wallace Mein, president; Stuart L. Rawlings, vice-president; G. B. Poore, vice-president and chief engineer; William Macnider, sales manager. H. A. Henry, a cement engineer with a successful record both local and foreign, has been engaged as superintendent of production. The chemical end is handled by H. J. Dunton who has had extensive experience in several Middle Western plants. The plant began operations May 26. The cement tests are according to standard specifications, and the machinery has operated very successfully.

A Merger and a New Cement Plant for Pacific Northwest

A merger of the Oregon Portland Cement Company and the Sun Portland Cement Company, both of Oregon, will probably take place in the very near future. Several Portland men are financially interested in both companies. R. P. Buchart of Victoria, B. C., is president of both companies. The merger will probably be effected by transferring both properties to a new corporation which will be formed by the group which now control the majority stock in both the Oregon Portland Cement Company and the Sun Portland Cement Company. Each of these companies is capitalized at the present time for $1,250,000.

An interesting side light on this merger has to do with the new Northwestern Portland Cement Company, which is now being organized for the purpose of manufacturing cement on the Skykomish river east of Everett, Washington. It is not officially known that this new company has any connection with the proposed merger of the Oregon Portland Cement Company and the Sun Portland Cement Company. George Macdonald, formerly vice president and manager and C. T. W. Hollister, formerly secretary and sales manager of the Sun Portland Cement Company are organizing the new Northwestern Portland Cement Company.

Santa Cruz Portland Cement Increasing Plant Capacity

About a half mile north of San Vincente canyon and 13 miles from Santa Cruz, California, at Davenport, is the operations of the Santa Cruz Portland Cement Company. The quarry is three miles up the canyon. The plant has been in continuous operation since 1907. The present capacity of 10,000 barrels per day is being increased to 14,000 barrels. Hardinge mills, Hummer screens, a low pressure oil burning system, the installation of rolls and some radical changes in the quarry methods have been largely responsible for the increased capacity.

The original quarry was opened in a narrow, deep ravine and was worked by a single bench with steam-shovel loading and delivery of the limestone to a crusher and finally to bins placed in a narrow part of the ravine. The limestone was loaded

from the bins into cars and transported by steam locomotives to the plant at Davenport over a standard gauge track. As the quarry face advanced, it became higher and higher until it reached a height of about 350 feet. Caving from the sides and inrush of sand caused by heavy rainfalls finally caused cessation of operations for the time being and resulted in a complete change of method.

Robert A. Kinzie, a metal-mining engineer, was placed in charge of quarry operations. Mr. Kinzie initiated a new method which combined glory holes, transfer raisers, bulldozing chambers, chute loading and adit transportation in a smoothly working system that has already delivered about 500,000 tons of limestone to the cement plant at a greatly reduced cost.

The present quarrying operations are divided into two parts: stripping the top of the limestone to a sufficient distance back to insure 4 years' production of limestone, and the quarry operations below the bench established by the stripping. Access to the stripping level is afforded by an incline and hoist up which all the equipment is hauled to the bench, upon which a track system has been laid out. Deep cross-ravines have been filled so as to avoid the sharpest curves.

Stripping is being done by an Osgood steam shovel (3¼ cubic yard bucket, Number 73) mounted upon caterpillar tractor. The overburden is loaded into 4 yard wooden dump cars, which are hauled in trains by 20 ton steam locomotives. Three trains are in operation. The overburden is dumped a short distance to the west of the stripping operations and several dumps are being built out from topographical indentations on the hillside. When these are filled to the limit, additional track extensions to the west will afford other dumping points. At the top of the limestone local depressions that contain sand are cleaned out with scrapers operated by compressed-air tugger hoists, of which three or four are available. Rock drilling is done by hand-held drills at present.

The locomotives and shovel use oil fuel, which is pumped to a tank above the stripping level. All of the equipment on this level was used in the previous quarry operations and in the transportation of the limestone to the cement plant. The only new equipment is the caterpillar tractor for the steam shovel. From 25 to 30 men are engaged in the stripping work.

On the loading-out level established by the former quarrying, an adit was driven into the limestone on a 0.5 per cent grade and two drifts turned off from this at 60 foot centers and extended along the principal axis of the deposit. Between the drifts and at an elevation of 30 feet above the haulage level a series of bulldozing chambers have been cut in the limestone. Each chamber is 80 feet long and 50 feet wide, flat topped, the bottom being hoppered out and connected to six chute-raises, three on each side. From the top of each chamber a raise 10 to 11 feet square extends to the floor of the quarry. These raises establish the position of the surface glory holes. They are spaced at intervals of 120 feet along the major axis and the same distance transversely. Six raises have been extended to the quarry level at present and other raises will be extended as they are needed.

In the center of a pillar between two pairs of haulageways a center drift is extended at the same level as the bulldozing chambers. Short connecting crosscuts extend to the bulldozing chambers opposite the chute raises. Sub-drifts are on either side of a line of bulldozing chambers and crosscuts give access to both sides of the bulldozing chambers opposite chute raises.

As a preliminary to extending the transfer raises, a center raise is driven at the intersection of the diagonals between four transfer raises and from this intermediate drives are made at 40 foot vertical intervals to the axes of the transfer raises. The raises are extended from the intermediates, section by section. A pilot raise 5 by 5 feet in section is first put through, and this slabbed off to the full section, a round being fired in the pilot raise and a round in the slabbing cut below. The broken limestone is drawn sufficiently to give working room in making slabbing cuts. Six-foot holes are drilled in raising, a CCII stoper being used. Four men, working two on each shift, extended a raise 11½ by 11½ feet in section 200 feet in 35 days. Timber is used only in driving the pilot raise, and this consists of a few stulls.

A glory hole is started by coning out the top of the raise at an angle of approximately 60 degrees down to the uppermost intermediate. The holes are given a 5 foot burden and are spaced about 5 feet apart. The purpose is to break the rock fine at the collar of the raise. This upper cone is established in order to capture as much rock as possible from the benches above, or, in other words, to spread out the drawing effect of the raise over a wide area. During the coning out the broken rock in the raises is drawn down to expose the benches that are cut. When the pit bottom is reached, the quarry face is carried back on a much flatter angle, sufficient, however, to cause the broken rock to gravitate to the bottom.

In breaking the benches above the cone, holes are given a 12 foot burden and are placed 10 feet apart. These proportions are approximate, as the quarry face is interrupted by a series of irregular partings into the face at a fairly steep angle. Holes are drilled to a maximum depth of 20 feet, the maximum steel length being 21 feet. They are sprung once or twice, the first charge being two sticks of 60 per cent dynamite (1 inch cartridges), and the second charge being four sticks. The holes are sprung at noontime, and when the shift returns they are blown out and 25 pounds of Her-

cules number 1 special (in bags) is poured into each hole. A number 6 electric blasting cap, with 20 foot lead, is used to explode the charge. The primer consists of a stick of 60 per cent dynamite placed well down in the bottom of the charge. Dirt is used for stemming.

Blasting is done near the end of the shift, and following this all loose rock is barred down. Bulldozing is done on the succeeding shift in the pit bottoms. The boulders are drilled and one stick of 40 per cent powder (1 inch cartidge) with 4 foot fuse is used for the work. Bulldozing is done in the bulldozing chambers with 40 per cent powder whenever a large piece of rock appears. Long drills are used for drilling, the driller standing on the shelf at the edge of the chamber and drilling the hole with the long steel from this position. As far as possible the driller avoids any work on the pile of broken rock except from the vantage points at the sides and ends of the chamber. An I-bolt with a rope attached is placed at each bulldozing crosscut, thus affording additional safety for the men who have occasionally to get on the rock pile.

In spite of the bulldozing in the open pits and in the bulldozing chambers, an occasional oversize piece gets to the loading chutes and more or less bulldozing is done at the chute mouth. The final product as loaded into the cars is thus kept well within the limits of the receiving crusher, which is a number 18 Allis-Chalmers gyratory. The maximum size limit is 60 by 30 inches. Signal whistles operated by compressed air are used as warnings of bulldozing at chutes and within the chambers.

The cones, transfer raises, bulldozing chambers and chute raises are kept full of rock. As the chutes are drawn the bulldozing chambers receive fresh accessions of broken rock from the transfer raises and these in turn from the cones and open pits. The subsidence is gradual and runs of broken rock in the bulldozing chambers are small and always well under control. The clean rock assumes a definite angle of repose, which is distributed at intervals by the undercutting produced by drawing the chutes. This continues until the equilibrium is disturbed sufficiently to cause a run of broken rock from the transfer raises.

An important feature of the transfer raise is the intermediates at regular intervals of about 40 feet vertically; these give access to the transfers and enable a hangup to be reached at a point close to the source of trouble. The usual method of handling a hangup is to tie a powder charge to a lath, 1½ by 2 inches in section, and introduce it below the hangup and explode it by electric blasting caps. This is repeated until the obstruction is loosened. The generous size of the transfer raise is an important element in securing freedom from hangups. The intermediates are an added insurance that if trouble occurs it can be localized and handled without great risk.

The adit is 9 by 12 feet in cross-section and the drifts are of the same size, equipped with a single 36 inch gauge track, 56 pound rails. The chute spacing is 30 feet on one side of the drift along the length of a bulldozing chamber.

There are 33 chutes available for loading. Sublevel drifts and crosscuts to the bulldozing chambers are 5 by 6 feet in dimension. Intermediates are the same and the manway raise to the intermediates 5 to 8 feet. A watch ditch, 3 by 4 feet in section, is cut on one side and follows one of the drifts to a raise that was extended upon an incline and then connected by a shaft from the surface. This shaft, which is lined with concrete, intersects the bottom of the ravine, and the water is carried by a flume to the shaft when its volume exceeds the capacity of the drainage holes or sinks in the limestone. The drainage system was subjected to a severe test during the past winter and functioned satisfactorily.

Jack-hammers are used in open pit work and for bulldozing. Crossbits and ⅛ inch hexagon drill settles are standard, and air is used to blow out the hole. Starting bits are 2 inches diameter and finishing bits 1¼ inches with 3 foot steel change and ⅛ inch gauge reduction. For bulldozing, 1¼ inch bits are used in drilling.

In open-pit work the practice is to clean up the top of the bench and work down to the bottom, clearing down all loose rock. The cut is then started at the bottom and worked up. Cleaning and barring down are done after each shot. The holes are placed where they will do the most good. The loose rock and sand are cleared away from each hole by compressed air before drilling is started. Surveys are made each month to determine the amount of loss or gain in broken rocks.

Olympic Portland Cement Company Makes Additions to Plant

The pioneer wet process cement plant on the North American Continent or better known as the Olympic Portland Cement Company, Ltd., has made some recent additions to the plant at Bellingham, Washington. These additions consist of one kiln 170 feet long, 9 feet by 10 feet, and a Unidan mill. The accompanying illustrations showing these units were taken prior to the housing of this equipment so that a full view of the machinery could be shown. This increases the kiln capacity of the plant to 3,000 barrels per day while the clinker mill will now produce 5,000 barrels daily.

This increase in capacity is hardly justified as far as demand for cement is concerned in the Pacific Northwest. Production in this territory is considerable in excess of consumption. While there is fair business in sight it will be some time before the demand in the Pacific Northwest equals the present capacity of the mills. The Olympic Portland Cement Company have, however, talked for

some time about putting in this kiln and thus better balancing their plant. This addition was accomplished without increasing the raw mill or coal mill capacity. The new kiln will place them in a position to take care of an increased demand when it does come and make it possible to operate the plant on a most efficient basis from now on.

The cement plant is located on Bellingham Bay alongside the main line of the Great Northern Railroad about two miles from the center of the city of Bellingham, Washington. The plant is also served by the Chicago, Milwaukee and St. Paul Railway and the Northern Pacific Railroad. The Marionette Road, the main paved road running north from Bellingham passes the plant on the east. Company tracks, reaching out into the Bay for 2,300 feet on their own dock, afford shipping facilities by ocean steamer or by barge to points on Puget Sound. Coal is mined locally. A plentiful supply of raw materials is within easy reach. This combination of favorable circumstances, coupled with a plentiful supply of labor, prompted the construction of the plant at this point.

Lime rock is secured at Balfour which is about 30 miles east of Bellingham on the Chicago, Milwaukee and St. Paul Railroad. Hydraulic giants strip the rock of the overlying dirt and debris. The rock is then shot and loaded by a Marion steam shovel into dump cars. The rock is dumped into a Fairmont crusher which reduces it to a 3 inch maximum. A Williams pulverizing mill reduces it still further to a 1 inch maximum discharging the rock into a bin. The Olympic Portland Cement Company maintains a switch engine of their own to load the standard railroad cars with the rock for shipment to the mill at Bellingham. The railroad company has assigned 42 fifty-ton bottom dump gondolas for this service, which insures an adequate supply of cars at all times.

Clay is secured from a point five miles north. Here the clay is loaded into standard railroad cars by a locomotive crane using an orange peel bucket. The cars containing the clay are spotted opposite the clay storage building at the mill and unloaded by an overhead electric crane using an orange peel bucket. This crane also handles the clay into the wash mill. While unloading the incoming cars, as much clay as possible is unloaded directly into the wash mill to save rehandling.

The wash mill thoroughly mixes the clay with water until the same resembles a syrupy mixture. It is then drawn off for screening and discharged into a storage basin in which it is kept agitated. Double plunger pumps lift the washed clay to the feeders of the three wet kominuters. An excess is pumped which flows back by gravity to the storage basin. The wash mill and agitating machinery were designed by F. L. Smidth Company and they also furnished the kominuters.

The limerock arrives in cars which are spotted for unloading by the company's own switch engine. A long trestle under a shed allows the rock to be

The New Kiln Recently Added By Olympic Portland Cement Company

bottom dumped from the cars into the covered storage space below. This building has a capacity for 9,000 tons of rock. A 20-inch belt conveyor is operated in a tunnel below the rock pile. The rock drops onto the belt through hoppered openings equipped with slide gates. The belt conveyor carries the rock to and discharges it onto a boot pit. This inclined bucket elevator raises the rock to the top of the building and discharges it onto a Link Belt conveyor. This Link-Belt conveyor distributes the rock into the raw mill bins. Rocker arm feeders control the flow of the rock to the kominuters, where it is mixed with the clay and water. The proportions are about 3¾ parts of rock to 1 part of clay while water constitutes 34 per cent of the whole.

This has brought the two main ingredients together in one of the three kominuters that give the material the first mill grinding. The discharge from the kominuters is elevated to a trix separator that allows the fines to pass on to the tube mills and returns the coarse particles to the kominuters for regrinding. Both returns are made through pipes by gravity. All of the finely ground material then passes through a 7 by 22 foot F. L. Smidth tube mill that gives the material a still further reduction, after which two 6 foot 6 inch by 10 foot tube mills divide the load and complete the raw grinding. The discharge from the tube mills is conveyed to any one of the three correcting basins and discharged to them. The large tube mill is operated by a 200 horsepower General Electric motor and the small tube mills by 100 horsepower motors of the same manufacture. The speed reduction is made through a Lenix drive in each case.

The slurry is drawn from the three correcting basins by gravity into a mixing basin. This procedure is controlled by the chemist, who uses this means to secure the proper mix for burning. An Ingersoll-Rand air lift pump delivers the slurry to the two kiln feed tanks. The slurry is then pumped from the kiln basins to the kiln feeders, which control the flow of material into the kilns. This slurry is kept in a creamy state by means of mechanical agitators in each of the basins.

Two Vulcan kilns, each 170 feet long and 9 feet in diameter at the feed end and enlarged to 10 feet in diameter throughout the burning zone, dry the slurry and then burn it to clinker. Each kiln is operated by a 50 horsepower General Electric variable speed motor through belt drives. The switches and controls for these motors are located at the operator's end of the kiln. Powdered coal is the fuel used for burning. After being discharged from the kiln, the clinker falls through a passageway to a 40 foot F. L. Smidth pressure cooler, one under each kiln. The clinker travels the length of the cooler on the inside and returns part way in a passageway between an inner and outer shell. Air for cooling is furnished by an American blower, which forces the air through the cooler in the opposite direction to that traversed by the clinker. That part of the air required for operation of the kiln is used in its heated state and the balance allowed to escape.

Both coolers discharge into a common Link-Belt conveyor that carries the cooled clinker to the clinker storage building. After elevating it is discharged onto piles in the building for mixing by a 15-ton Bay City locomotive crane. The Olympic Portland Cement Company has found that fresh clinker mixed with aged clinker in equal proportions is easier to grind than fresh clinker only as it comes from the cooler. A reclaiming conveyor operating under the clinker storage transports the mixed clinker to the dry mill, where it is elevated to the clinker bins, which are located in the top of the dry mill building.

The Bay City crane used for mixing clinker also unloads the incoming gypsum from the railroad cars onto a pile in the clinker storage building or into a hopper over the reclaiming conveyor under the clinker storage. This reclaiming conveyor carries the gypsum to the dry mill, where it is elevated to a gypsum bin located alongside the clinker bins.

Proportioning of the finished product is done by spotting a steel car under the discharge spouts from the clinker and gypsum bins and drawing off the proper proportions of each into the car. The car is moved by hand a few feet and dumped into the kominuter feed bins located directly over the feeders of the kominuters. Two number 85 F. L. Smidth kominuters perform the first stage of the finish grinding. Various sized balls are used for the grinding agents.

Discharged from the kominuters into a common screw conveyor, the partially ground cement is carried to an elevator which discharges into a screw conveyor operating over the two tube mill feed bins. Two number 18 tube mills complete the grinding of the cement, using cylpebs for the charge. Motors of 100 horse power are required to operate each kominuter and 200 horse power motors are used on each of the tube mills. The clinker, gypsum, kominuter, and tube mill bins are constructed of structural steel beams and plates. The bins are placed side by side wherever possible to conserve space and steel.

A screw conveyor operating under the discharge from each tube mill carries the cement to the end of the dry mill building. Here it is discharged onto a belt conveyor, set at an angle of 30 degrees, which elevates the cement to the top of the storage silos and discharges it into a screw conveyor, which distributes the cement to the various silos. There are 10 silos, each holding 10,000 barrels of cement. They are arranged in two groups on each side of the bag and packing house, which is di-

rectly under the inclined belt conveyor coming from the dry mill to the silos.

A machine, called an Xbiner, which is an F. L. Smidth product, draws the cement from the silos and discharges it into a screw conveyor operating in a tunnel underneath the row of silos. There are two of these machines and they travel on their own tracks and discharge into the same screw conveyor. The Xbiner is connected to an opening in the bottom of the silo and the slide withdrawn. The cement falls into a screw that feeds the cement into the longitudinal conveyor without floods or escape of cement dust. A motor direct connected to the machinery of the Xbiner and mounted on the carriage of the machine operates it. An attendant is not required constantly in the tunnel to operate the Xbiners. After connecting it to the proper bin, the operator goes back to the packing house for other work. After going through several tunnels where there was a deafening din, caused by the pounding on the pipes leading from the bins to the conveyor, it was a treat to go through this tunnel where you could talk and be understood and where you did not have to dodge spurts of cement caused by flooding of the pipes.

An elevator takes the cement discharged from the screw conveyor and elevates it to the top of the packing house and there discharges it into a screw that screens the cement and then discharges it into the large steel bins over the Bates 4-tube packers. These steel bins have circular bottoms with the packers connected to the lower part. There are two such bins with two Bates packers under each, with provisions for additional packers and for packing in barrels if desired. Spill elevators reclaim the cement spilled in sacking and return it to the screen for packing later. Dust collectors keep the packing house in a livable condition.

The sacked cement falls onto belt conveyors that discharge into trucks on the cars spotted on tracks alongside each side of the packing house. It is possible to load 4,000 barrels of cement on a single switch. The company owns its own cars for handling this amount of cement to the dock for loading onto barges or ocean steamers. This saves railroad charges and insures enough cars to handle a cargo of cement when the boat can call for it. A switch engine owned by the cement company handles the cars to the dock as well as doing any switching required throughout the plant.

Fuel oil was originally used for calcining the clinker, but, in 1918 a coal pulverizing plant was installed replacing the oil for kiln fuel. The oil installation is still in place for use in case an emergency should arise. Bellingham coal is secured at a very low cost from the nearby mines and brought to the plant by railroad. A coal storage shed was constructed from the coal mill building over to and covering the track to the rock storage. This track is built on a trestle above the plant level, affording an opportunity to dump the cars by gravity. An inclined apron conveyor was constructed under the track throughout the length of the coal storage shed, onto which the coal is

The New Unidan Mill Added By Olympic Portland Cement Company

dumped through the tracks from bottom dump gondolas and deflected towards the coal mill building. Tracks in the shed on the ground level provide a means for the coal to be reclaimed by a locomotive crane. This crane loads the coal into bottom dump cars for dumping into the coal mill hopper. Incoming coal is dumped directly into the mill hopper if possible to save the extra handling.

The coal is elevated from the hopper to the wet coal bin over the dryer, from which it is fed to the dryer by a feeder. After passing through the Cummer dryer it is given a two stage grinding. First it goes through a kominuter and then through a tube mill. The powdered coal is conveyed to the kiln feed bins in the kiln building.

The dryer fuel is raw coal fed through automatic stokers to the fire box. Air for drying the coal is drawn in through the fire, traversing the length of the dryer on the outside of the shell carrying the coal. An exhauster fan discharges the air to a double stage set of cyclone dust collectors that cleanse the air before allowing it to escape.

The kiln feed coal tanks have a capacity of ten tons of powdered coal each. There is one tank for each kiln equipped with independent units for feeding the coal to the kilns. The feeding is done by a screw conveyor operated so as to draw coal from the bin. A Smidth variable speed friction device allows the burner to change the rate of feed as desired. The feeder screw discharges into a pipe through which a blower is forcing air into the kilns. This stream of air carries the coal into the kiln and projects it into the burning zone. The air for the operation is furnished by a Garden City fan.

F. L. Smidth and Company designed and supervised the construction of the plant for the owners. Provisions have been made in the original plans for increasing the plant from a 2 kiln plant to a 6 kiln plant which would be three times the present capacity. The level site has favored an excellent track layout. All trackage is owned by the cement company and is interconnected with a suitable switching arrangement at each end of the plant for easy handling of cars throughout the plant entirely on their own tracks.

A large reinforced concrete water tank built by running up a set of silo forms and flooring across at the desired points supplies the water for plant use. A condensing tank is used for supplying circulating water to bearings, etc., and cuts down the amount of pumping necessary. Electric power for plant operation is secured from the Puget Sound Light and Traction Company, and stepped down to plant voltage in a sub station at the plant. Reinforced concrete machine shop and storehouse buildings well equipped for caring for the needs of the plant are conveniently located to the main parts of the plant. The office is also of reinforced concrete and located on the roadway entering the plant. A large, commodious washroom with shower baths is provided in a building for the use of employees.

Mr. A. F. Krabbe, the superintendent, takes great pride in the appearance of the plant. All of the open space between the buildings not used for walkways, roadways or trackage has been turned into lawn and is kept in excellent condition. Flowers are growing everywhere, which together with the great variety of trees that are in excellent condition are evident that there is no damage done around this plant from cement dust.

The company has constructed a large, commodious reinforced concrete house for the use of the superintendent. It is located in a grove of trees between the office and the Bay.

The Olympic Portland Cement Company, Ltd., has its main office in London, England, where Mr. Williamson, the Chairman of the Board, and Mr. Ross, the Secretary, reside. Mr. A. F. Krabbe is manager and superintendent of the plant. His home and office are at the plant.

Large Manganese Ore Deposits Available in Washington

The State of Washington contains a large area of manganese producing rocks according to the Geological Survey. The belt extends from Humptulips in the south west eastward to Skohomish River and west and north past Mount Constance and Lake Crescent to Beaver Creek. This distance is about one hundred and ten miles. It is found below an altitude of 4,000 feet on the outer, timbered slopes of the mountains. Working within the area is difficult owing to the forest growth and uncleared ground. The rocks are largely sandstone, shale and lava of a gray color, and limestone of a dark red color shading to brown.

Near the northwest end of this area of manganese bearing rocks a mine known as the Crescent has been opened and a large deposit of manganese ore of commercial grade has been developed. This mine is about a mile west of Lake Crescent in Clallam County. The manganese is shipped to Port Angeles and by way of Panama Canal to Philadelphia to be used in manufacture of steel. The ore consists of hausmannite, a hard black oxide which contains about 72 per cent of metallic manganese. The hausmannite contains a carbonate of manganese and silicate bementite forming an ore not found elsewhere. It is a high grade ore with a content of metallic manganese ranging from 50 to 54 per cent; silica content is about 9 per cent; iron less than 1 per cent and phosphorus less than 0.05 per cent. It is low in impurities.

The large extent of the manganese bearing rocks offers unlimited opportunity to develop other outcrops. The average annual consumption in the United States of ore containing more than 35 per cent of manganese is about 500,000 tons.

TRENDS IN THE MANUFACTURE OF CEMENT ON THE PACIFIC COAST

By Charles L. Carman

CALIFORNIA occupies a leading position in the cement industry on the Pacific Coast and has reached this position within relatively few years. The causes contributory to this, among others, are the statewide activities in the building fields, extensive highway and hydro-electric programs and harbor and dock improvement schedules. When it is noted that climatic changes do not tend to hamper all-year activity, the reason for the high per capita consumption of cement will be seen.

It would be impossible to attempt to forecast the point of saturation in the cement field; suffice it to say that this point will not be reached in California for some time to come. It is logical that, with these market conditions, there should result marked activity in the formation of new companies for the manufacture of cement. The effect of this activity on the industry is somewhat problematical, but, whether or not this is the cause, it is a fact that the companies in this State now producing cement have committed themselves to extensive programs of research and development, having as their aim not only the increase of present plant production without extensive additions of equipment, but also the reduction of operating costs in all departments, the better to meet competition from plants recently entering the field.

In a brief survey of the industry on the Pacific Coast regarding trends of development in the quarry, grinding and calcining departments of cement manufacture, no radical departure from established practice will be noted. In quarrying limestone the physical characteristics of the raw material deposit largely determine the method of quarry operation of each particular plant. As a matter of interest, quarry methods include all the well known methods, from the "glory hole" of the mining industry to that of dredging oyster shells from the bottom of the sea, and good cement is made from all these materials. Limestone suitable for the manufacture of cement occurs on the Pacific Slope in deposits or "lenses" at various points with different degrees of accessibility, and the wide prevalence of electric power at reasonable rates throughout the Pacific Coast States, accounts for the location of plants seemingly at random in districts more or less remote from large markets and distribution centers.

In grinding, the reduction of materials in both the raw and finishing departments is receiving considerable attention, especially the finish-grind. In this department the tendency is toward large, multi-compartment tube mills as being the most efficient units, considering quantity and quality of output. Much experimental work has been done in connection with this type of multi-compartment mill, with a view of securing proper classification of grinding media without the use of internal diaphragms. Such a mill has been developed, built, and is now undergoing a series of extensive tests, in which the classification of balls is secured by means of special liners. Results to date indicate that mill output is increased, with the same power input, in comparison with the standard compartment mill.

The practice of grinding in closed circuit with classifiers, prevalent in the mining and metallurgical industry, is being analyzed with the view of adapting the practice to the manufacture of cement. One company in this State has replaced its original ball and tube mill installation with large ball mills with attached air classifiers. These mills are preceded by crushing rolls for the preliminary reduction, and are therefore merely a substitute for the finishing tube mills. Whether or not the arrangement will prove more efficient than the compartment mills in power required and maintenance in the long run remains to be seen, but the output will undoubtedly be of uniform fineness. In the material and design of liners for tube mills some companies manufacturing cement by the slurry process have equipped their raw tube mills with rubber liners with satisfactory results.

In calcining no radical departure from established practice is in evidence; increased production is being secured by enlarging the burning zones of present kilns in one instance; natural gas is being used as a substitute for fuel oil in one large plant, with good results. Experiments are being conducted by one company with the Wedge or Holthoff furnace, a type in extensive use in the metallurgical industry for roasting ores, but have not progressed to a point where it is possible to forecast results.

As regards the problem of waste heat recovery and power generation therefrom, no cement plant on the Pacific Coast has considered it of enough advantage to warrant the investment necessary. In all probability the reason for this attitude lies in the present low cost of electric power, with the resultant absence of individual steam power plants at the mills. However, notwithstanding the low cost of electric power, there is a margin of economy to be effected by the installation of heat recovery plants even though such installations in this State must include the turbo-generating equipment as well as the boiler plant. Some of the companies are now considering this subject, and it is highly probable that in the near future some of them will avail themselves of the saving in manufacturing

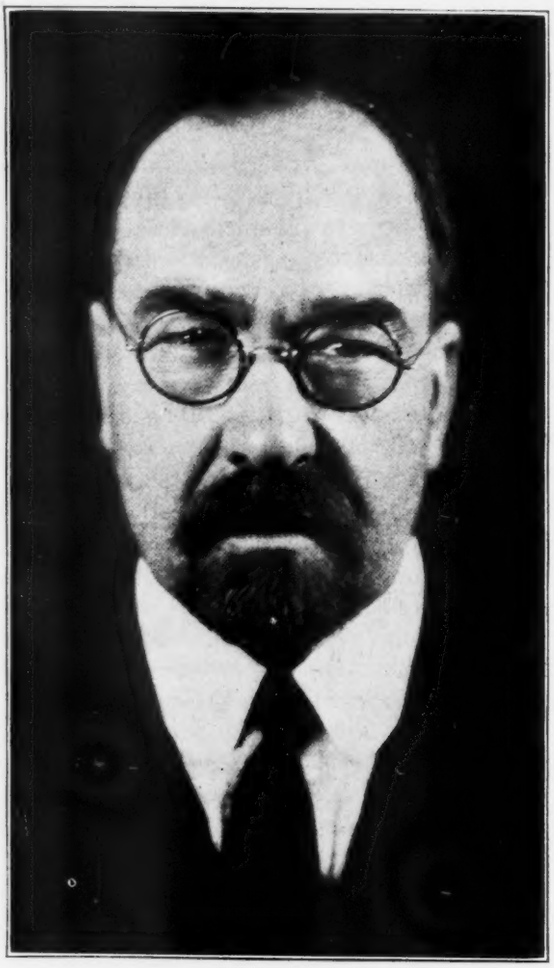
cost possible with such an installation.

In general, there seems to be a tendency for those in the cement industry to experiment with methods and equipment developed for the dressing and treatment of ores in the mining and metallurgical industry. Whether such equipment and methods can be advantageously applied to the cement industry is a matter of some doubt. The two products are entirely dissimilar, and the end sought in each industry is exactly the opposite of the other. One is the process of concentration, of elimination and segregation, the final product being a very small portion of the total amount of ore treated; the other is a process of chemical combination to produce a product with substantially no reduction in volume, which, to be utilized, must undergo still further chemical action by combination with water.

This tendency is not confined to California or the Pacific Coast States, but extends throughout the industry, and is the expression of a desire to improve present practice. Indications are that new plants are being designed to embody greater simplicity of layout with resultant reduced payroll and upkeep expense.

F. W. Schmidt

Not only those engaged in the crushed stone industry but many other readers will be grieved to know of the death of Frederick Wilhelm Schmidt on Friday evening, September 3, at his home in Millington, New Jersey. Mr. Schmidt was born August 27, 1865 at Millington, New Jersey.



Frederick Wilhelm Schmidt

In the early years of his life, he was associated with his uncle, Frederick Nishwitz, in the manufacture of farm machinery and in 1888 moved to Morristown to join his father, John H. Schmidt, in the manufacture of carriages. It was in 1895 that he first became seriously interested in the construction of highways which was then receiving attention in New Jersey, this state being one of the first to scientifically and earnestly undertake the construction of roads adapted to automobile traffic, prompted largely by the demands set up by New Jersey coast resorts. It was about this time that he organized the Morris County Crushed Stone Company for the purpose of quarrying trap rock for road building purposes. As time went on his stone operations increased in number and capacity, both in New Jersey and in the state of New York. At the time of his death, Mr. Schmidt controlled directly or through the North Jersey Quarry Company, the Buffalo Crushed Stone Company, Buffalo, New York; the Suffern Stone Company, Inc., Suffern, New York; the Consolidated Stone and Sand Company, Great Notch, New Jersey; the Bound Brook Crushed Stone Company, Bound Brook, New Jersey; the Paterson Crushed Stone Company, Paterson, New Jersey; the Commonwealth Quarry Company, Summit, New Jersey; the Portland Sand and Gravel Company, Portland, Pennsylvania; and F. R. Upton, Inc., Newark, New Jersey. His associate in control of the Buffalo Crushed Stone Company is James Savage, the treasurer of the National Crushed Stone Association.

Mr. Schmidt was one of the founders of the New Jersey Manufacturers Association and was a director in that organization from the time of its inception. He was also one of the founders of the National Crushed Stone Association and when this organization was formed by a small group in Chicago in the winter of 1918, he was one of the first to pledge financial support. He was continuously on the Board of Directors, for several years on the Executive Committee, and in 1923 was elected President. In 1910 he became interested in a bituminous pavement known as Amesite and was largely instrumental in perfecting this pavement which is now so well known and extensively used.

His strong, fine, genial personality was known to the producers of crushed stone from coast to coast. He was untiring in his devotion to the welfare of this industry and he saw in the National Association a means whereby the industry could prosper and expand along sound and proper lines of development.

PROBLEMS OF A TREMENDOUS ROCK QUARRY HANDLED BY CALIFORNIA COMPANY

CONTRACTS for 2,000,000 tons of rock are not common, even on the Pacific Coast where things in general have the reputation of coming big. The contract for the construction of the moles and breakwater for the Long Beach Harbor at Long Beach, California, was secured by the Hauser Construction Company and this job requires 2,000,000 tons of rock. The problem of supplying this stone was undertaken by the Hauser Construction Company. This company, which maintains offices on the Pacific Coast at Long Beach, Oakland, and Portland, has found it necessary in supplying this rock to enter the crushed stone business from a production standpoint.

This rock problem naturally divides itself into three parts: quarrying and loading, transporting, and unloading the rock into place. The major problem is necessarily the production of the rock in the quarry. In this instance it has meant the development of one of the largest big rock quarries on the American continent. The daily deliveries of big rock on this job are larger than those of any similar harbor project heretofore initiated in this country. The problem and the solution are of particular interest.

The development of an adequate quarry was a particularly difficult problem inasmuch as rock of suitable quality susceptible of production in large quantities had to be found within a reasonable rail haul of Long Beach. In general the rock within this haul-zone is of inferior quality, or shatters in quarrying into sizes too small, or does not occur in sufficient quantity to justify a large development. The quarry being developed by the Hauser Construction Company is the largest deposit of high grade granite within a permissible hauling distance and occurs as an isolated hill approximately a mile long, a quarter of a mile wide, and over three hundred feet high. This deposit contains about 15,000,000 tons. It is in Riverside County, about eighty miles from Long Beach. The quarry has been developed along the most modern lines by building an up-to-date camp accommodating 150 men, by constructing several miles of standard gauge railroad tracks, by building and equipping machine shops and power plant, and by developing

Coyote Shot on May 17, 1926, Using 182,000 Pounds of 20 Per Cent Gelatin To Secure 500,000 Ton Rock

a water supply and provisions for the storage of large quantities of explosives and fuel. It was necessary to remove from the lower slopes of the quarry some 50,000 cubic yards of sand and earth which had settled there over the hard sound rock. All of this work has been done, and for the past twelve months rock has been moving to the harbor in quantities in excess of contract requirements.

The rock is broken by the "coyote" or tunnel method of shooting. Tunnels approximately three feet wide and four and a half feet high, or just large enough for one man to work in, are driven into the solid granite from 30 to 75 feet by the use of air drills and dynamite. At the ends of these tunnels cross tunnels are driven which are enlarged at suitable intervals to provide space for the packing of high explosives. These powder pockets are then filled with dynamite, and the entire tunnel is backfilled and tamped with earth and rock. Usually four or five of these tunnels are shot at one time, and the quantity of dynamite used varies from 30,000 to 182,000 pounds. When these shots are made, it is necessary to remove temporarily all the tracks directly in front of the shots.

Rock over 15 tons in weight after a large shot is further broken by drilling with air drills operated by two 15x9½x12 inch Ingersoll Rand air compressors, each driven by a 100 h.p. induction motor. The rocks are then shot with dynamite to reduce these large pieces to fragments sufficiently small to be handled by the steam shovels. These steam shovels are capable of handling the largest rock required on the job. No derricks are used. On this contract 600,000 tons have been delivered during the first year of operation of the quarry, and the capacity is now 800,000 tons per year.

The rock after being broken is sorted into proper sizes and loaded by steam shovels directly upon flat cars or automatic side dump cars. The shovels used at this quarry are: one Marion model 60 railroad type, two Bucyrus model 50-B caterpillar, and one Bucyrus model 30-B caterpillar. The Union Pacific Railroad Company has assigned 275 standard 100,000-pound flat cars and 45 100,000-pound Clark air dump cars to remove the rock to the breakwater, and the daily movement of approximately 3,000 tons of rock requires 60 cars. Two 70-ton standard gauge switch engines are used to shunt the cars into position to form a train load. When a train load of loaded cars has been formed, it is turned over to the Union Pacific Railroad which hauls it approximately eighty miles to Long

The Riverside Quarry Early In January, 1926

Beach, there turning the cars back to the contractor.

At the site of each structure there is constructed into the ocean a standard railroad trestle on pilings which vary in length from 30 to 75 feet. After the cars of rock have been delivered to the contractor, the locomotive takes them out on these trestles where the various sizes are unloaded in places designated by the engineers. A small steam shovel which moves directly on top of the cars is used for unloading. In general the small rock is placed on the inside or core of the rock structures, and the large rock is placed last as a protection to the finer material. After the moles and breakwater are completed, the portions of the trestle above the finished structure will be removed. The work now under contract will require the movement of over thirty thousand car loads of rock and will require about thirty months for its completion. The equipment used, as well as the methods adopted, are most modern and insure that this improvement, which is so vital to Long Beach, will be completed within the period specified in the contract. The first year of operation on this contract ended on August 31, 1926. During this period a total of 606,358 tons of rock have been delivered into the water, and in addition approximately 25,000 tons have been disposed of on other contracts. The requirements under the contract with the City of Long Beach have been exceeded by 70,858 tons.

This company also maintains a complete blacksmith and machine shop. The equipment found in this department includes one class A. Sullivan drill sharpener complete with oil furnace for heating and tempering, and adequate storage for fuel oil and water. Service pipes for water and oil from the storage and air from the two compressors are carried in covered trenches the entire length of the quarry floor with outlets provided every hundred feet through proper junction boxes. The main lines for all these service pipes are below ground and therefore cannot be damaged when letting off a shot. A powder magazine capable of storing 150,000 pounds of explosives as well as a separate magazine for caps and exploders have been provided at an isolated point on the property.

Robert Gorden is superintendent of all quarry operations, assisted by Frank O'Brien, George Meyers, and Ernest Lyndale, foreman; while William B. Arndt is superintendent of the waterfront activities. K. B. Kumpe, vice president and general manager is actively in charge of all of the operations. The Hauser Construction Company is engaged in similar work at the present time for the United States Government at the entrance of Coos Bay, Marshfield, Oregon.

A New Demonstration Highway

A demonstration highway from which it is expected to obtain valuable information comparable with that produced by the Bates Road and Pittsburg, California tests and the experiments of the Bureau of Public Roads at Arlington, Virginia, is now under construction between Fairfax and Warrenton, Virginia, a length of 9 miles. The road, which is being built by the Virginia Highway Commission, is a Federal-Aid project.

The new demonstration is not intended as a test of road design or of the relative value of different surfacing materials.

The Unloading Operation At Long Beach Breakwater

MAKING MONEY OUT OF AN ABANDONED PIT WITH A POWER DRAG SCRAPER

By Dale G. Loftin

HOW would you set about to work a wet pit from which the upper layer of loose material has been removed, leaving only a 10 foot depth of coarse, hard-packed gravel? These are the conditions that prevail in a pit at Gold Hill, Oregon, where Wm. von der Hellen is operating a plant to produce railroad ballast for the Southern Pacific Company. A power drag scraper has been adapted to the situation very satisfactorily, and by exercising a little ingenuity at times in aiding the excavator when the difficulties are greatest, a daily production of 475 cubic yards is maintained at economical cost.

The Effect Produced By Dropping a Stick of Dynamite Over Bank Into Path of Scraper

The total depth of the deposit is about 22 feet; but before Mr. von der Hellen took over the pit, most of the material above the water line had been taken out by a steam shovel, and the strata of gravel 10 feet thick that remained was firmly packed and contained a generous quantity of large boulders. It was certainly not what could be called a very attractive proposition.

The excavator installed by Mr. von der Hellen is a 350 foot span, 2½ cubic yard Sauerman power drag scraper. This delivers the material to an inclined belt conveyor 200 feet in length, which in turn discharges into a plant where the material is washed, crushed and sized. At present, the sand is being stocked on nearby ground by use of flume and water, and will be reclaimed at some future time and marketed. The remainder of the material is separated into ¾ and 2 inch sizes. These are delivered by gravity into railroad cars and used for side fill and ballast, respectively. The ¾ inch material is used also as station platform surfacing and yard track ballast. In digging the non-caving material in this pit, which is particularly subborn in places, he has found that a small amount of powder, judiciously used, is an inexpensive means of easing matters for the scraper and saving excessive wear on the equipment.

The new gelatin 50 per cent is very well adapted to this purpose. Small shots, of not over two or three sticks, are dropped over the bank, evenly distributed throughout the length of the pit at intervals best determined by trial. These will shake the bank loose, if there are three or four feet of water where they are dropped, and often bring down a day's run of gravel, besides separating the caked mud from the boulders. The amount of powder, even if used continuously, should not exceed 1/10 to 1/5 of a pound to the cubic yard of material, an amount almost negligible.

Largest Feldspar Operation in California

Probably the largest deposit of feldspar being worked in California is that of the Pacific Sanitary Porcelain Company of Richmond, California, located on a ridge south of Cottonwood Creek not far from Campo. The outcrop of silica and feldspar, occurring in granite, is from 300 to 500 feet wide and extends northeast 1,600 feet. The top of the deposit is about 500 feet above an open cut 200 feet wide and approximately 75 feet high with which the outcrop has been opened up. The feldspar is massive and free from impurities, requiring only the sorting out of some veins and boulders of quartz which are found with the spar.

The material is hauled to an incline chute and passed over a section of ¼ mesh screen which eliminates the dust and fine material. From the chute it is delivered to a 40 ton storage bin from which it is passed over a 1 inch grizzly. After passing the grizzly the feldspar is sent to a revolving screen 8 feet long and is screened to ½ inch size. The oversize goes to a 10 by 20 inch Blake crusher and is crushed to pass a 3 inch ring. The material then passes to a screen 4 feet long with 3 inch openings where it is washed.

Production of approximately 1,000 tons a month is carried on by the Pacific Sanitary Porcelain Company. Power for the plant is secured from a Fairbanks Morse Y type gas engine.

MODEL CALIFORNIA SAND AND GRAVEL PLANTS

By H. W. Munday

CALIFORNIA, particularly in and around Los Angeles, is a most interesting section of the country as far as sand and gravel plants are concerned. Some of the most efficient plants in the country can be found in this territory. Conditions of the industry will not be discussed here as nearly all the factors are local and the producers are fairly well organized and appear to be handling the local situation in a commendable manner. Let us rather discuss some representative and recent plants.

The Union Rock Company Largest in the World

The Union Rock Company, of Los Angeles, California, has continued its expansion program this year until today this company is by far the largest producer and distributor of crushed stone, sand and gravel in the world, and is also one of the most efficiently organized and managed institutions in the entire non-metallic mineral industry.

The Union Rock Company, at the present time, has eleven producing sand, rock and gravel plants, with the largest and most up-to-date, which is all reinforced concrete and steel, at Baldwin Park, California. Most of these plants are on the Southern Pacific, Santa Fe, and Pacific Electric Railroads, the Arroyo Seco Plant being on the Union Pacific Railroad. Being on four railroads, they can serve all sections of Southern California, from San Luis Obispo and Saugus to the Mexican Border. The eleven producing sand, rock and gravel plants are as follows:

1. Rivas, near Duarte, San Gabriel River Valley.
2. Kincaid, near Azusa, San Gabriel River Valley.
3. Largo, near Azusa, San Gabriel River Valley.
4. Crushton, San Gabriel River Valley.
5. Baldwin Park, San Gabriel River Valley.
6. Durbin, San Gabriel River Valley.
7. Boulevard Plant, San Fernando Valley, Tejunga Wash, adjacent to Hollywood.
8. Amerian Plant, Claremont.

Steam Shovel Working in the Pit at the Baldwin Park Plant.

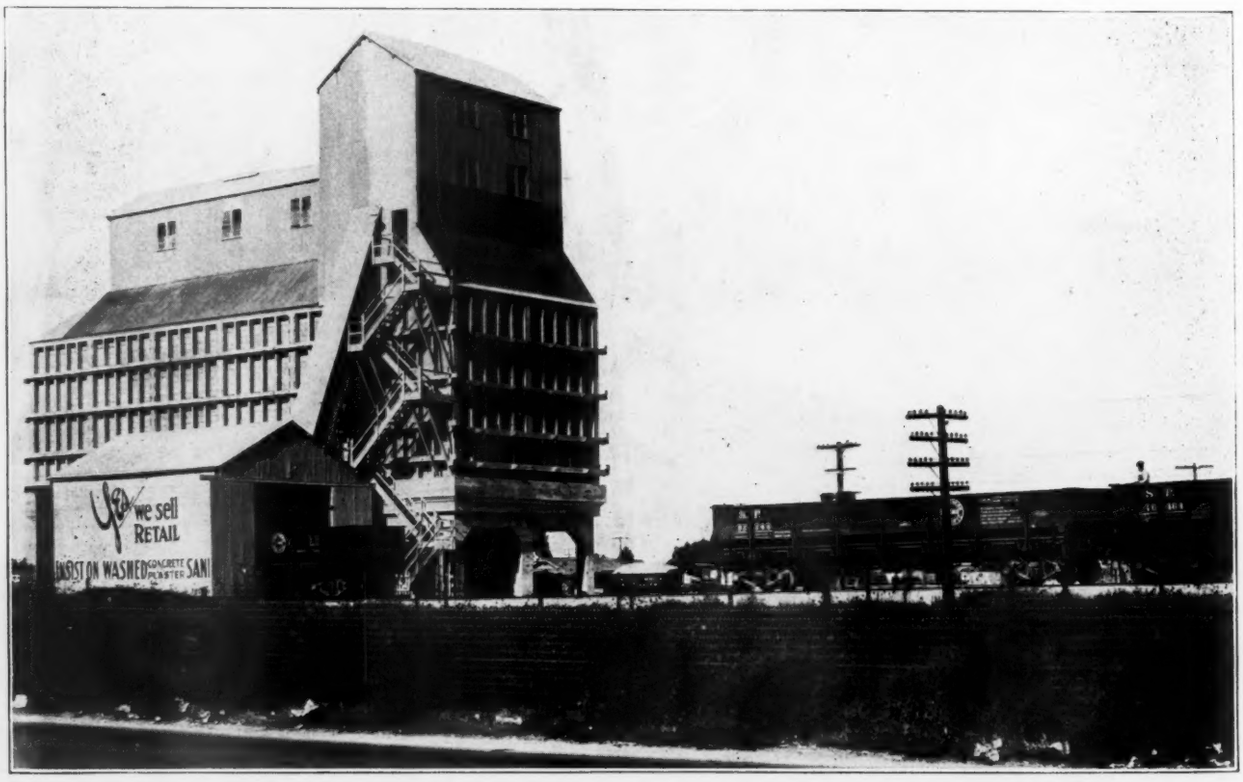
9. Arroyo Seco Plant, Highland Park District, Los Angeles.
10. Culver City Plant, Culver City.
11. Brush Canyon Quarry, Hollywood, Calif.

The distributing stations and bunkers are as follows:

1. Sixteenth Street Bunker, serves Metropolitan and Industrial Districts of Los Angeles.
2. Twentieth Street Bunker, serves Metropolitan and Industrial Districts of Los Angeles.
3. Merrill Avenue Bunker, serves Huntington Park, Southeast Los Angeles and Goodyear Industrial District.
4. Vineyard Distributing Station, serves Pico Heights, Wilshire and West Adams Sections of Los Angeles and Hollywood.
5. Slauson Avenue Bunker, serves Southwest Los Angeles, Inglewood and Hawthorne.
6. Sherman Bunkers, serves Sherman, Beverly Hills and West Hollywood.
7. Home Junction Bunkers, serves Santa Monica, Westwood and Holmby Hills.
8. Culver City Bunkers, serves Culver City, Venice, Baldwin Hills Oil Fields, and West Adams District of Los Angeles.
9. Compton Bunkers, serves Compton, Lynwood, Hynes, Bellflower and Gardena Sections of Los Angeles County.
10. McDonald Bunkers, San Pedro District (Los Angeles Harbor).
11. Long Beach Bunkers, serves Long Beach and Signal Hill District.
12. Los Nietos Bunkers, serves Whittier, Norwalk, Rivera and Santa Fe Springs Oil Fields.
13. Wilmington Bunkers, serves the Los Angeles Harbor District.
14. Hermosa Beach Bunkers, serves Hermosa Beach, Redondo Beach and Manhattan Beach and back country.
15. El Monte Bunkers, serves Alhambra, South Pasadena, and the east side of the Los Angeles Industrial District.

Sand, rock and gravel are delivered by motor truck from these various distributing stations and bunkers, throughout Los Angeles County. In addition to the rail facilities at the various plants, the Uion Rock Company also delivers by motor truck, giving the public a short haul service from the plants as well as from the bunkers and distributing stations.

The Baldwin Park plant of the Union Rock Company is one of the most modern and complete plants in the United States. The open pit from which material is taken covers a considerable area, where a Lidgerwood electrically operated dragline, with 3½ yard bucket, and a Marion number 60 steam shovel with a 3 yard dipper, are operated at different points, and each of those excavating units is served by its own haulage system. The dragline loads material into a portable hopper, having electrically controlled gates, and feeds from the hopper into 10 yard end-dump cars. The loaded cars are hauled over 1,500 feet of track by a Lidgerwood hoist operated by a 100 h.p. motor, the car and hoist being connected by a 1 inch cable. The cars of gravel and sand are dumped into a hopper bottomed bin from which the material is fed to the main belt conveyor.



View of Bunker Which Has 4,000 Tons Capacity

The steam shovel, operating in another part of the pit, loads the gravel and sand into 40-yard bottom-dump cars which are hauled by a Plymouth gasoline locomotive over 3,500 feet of track to the foot of an incline. At that point the locomotive is detached and one car at a time is pulled up the incline by a Hendy electric hoist operated by a 100 h.p. motor. At the top of the incline the 40-yard cars are dumped into a hopper of 90 yards capacity, lined with ⅜-inch boiler plate. The material passes from this hopper to the main belt conveyor mentioned in connection with handling the material from the dragline. Incidentally the dragline digs to a depth of about 30 feet, about 8 feet of which is below the level of seepage water. The steam shovel works against a bank and its first cut is to a depth of 8 feet. The two units supply about an equal yardage to the plant.

There are two inclines over which cars of material from the pit are delivered to hoppers below by electric hoists. These hoppers are feed bins for the main belt conveyor over which all pit material is delivered to the crushing plant. This conveyor, consisting of a B. F. Goodrich rubber belt, is 36 inches wide and has an operating length of 600 feet between centers. It runs on troughing rollers manufactured by the Bodinson Manufacturing Company and its time over the 600-foot line is 1 minute 6 seconds. It has a carrying capacity of 1,500 cubic yards in 10 hours and is loaded by a stream from both hoppers continuously. The multiple tandem drive on this conveyor, consisting of driven pulleys and idlers, gives the best increased contact on pulleys. The 100 h.p. motor which drives the conveyor is connected by reduction gears to the driving shaft, the entire driving unit, with pulleys and idlers, being installed below the plane of the conveyor line.

The last 200 feet of this conveyor runs up a 30 degree incline to the top of the crusher building, where it discharges the material into a two-section scalping screen, 60 inches diameter and 18 feet in length. The first section has 2¼-inch perforations, those in the second section being 4 inches. This scalper separates all sand and gravel of 2¼ inches and smaller from the oversizes of both sections. This oversize running from 2¼ inches and larger up to 6 and 7-inch boulders, is passed to an Allis-Chalmers number 7½ gyratory crusher, which reduces to 2½ inches and less. The undersize from the first scalper section is passed by conveyor belt number 4 up a steep incline to the washing screens above the bunkers. The length of this conveyor is 150 feet. The undersize from the second scalper section is carried by conveyor number 2 that feeds into a set of screens, the oversize of which is recrushed by a Symons 48 inch vertical disc. The product of the Allis-Chalmers gyratory

Close Up of Plant Which is Constructed of Reinforced Concrete and Structural Steel

is carried by belt conveyor to a 12 foot by 48 inch trommel have 2 inch openings. Its oversize is recrushed by a Kennedy number 37 gyratory crusher, this product being carried by belt conveyor to a revolving screen above the bunkers. The trommel undersize is likewise carried by belt conveyor to sizing and washing screens over the bunkers.

The sand and gravel passing the 2 inch holes of the scalper on being conveyed by conveyor number 4 to the top of the mill are fed into twin sand washing screens. These are each 48 inches diameter and 24 feet long. By them the gravel is graded into several commercial sizes. The sand is washed through a screen jacket of 5/16 inch perforations and passed to Kennedy-Van Saun separators in which two grades of sand are made, the silt being eliminated by overflow. The twin screens produce ½ inch, 1 inch and 1½ inch crushed gravel grades, as well as the sand from ¼ inch down to fines.

Number 3 conveyor, which carries the crushed rock products from the crushing plant, delivers material to sizing screen over the bunkers, by which ½ inch, ¾ inch, 1½ inch and 2 inch sizes are made. This screen is equipped with a short, fine-screen jacket for eliminating the soil and silt.

The bunker building, of substantial mill construction, is 105 feet long, 33 feet wide and extends to a height of 22 feet above the bin floor. It contains 24 bins, each of 150 tons capacity. This gives a total bunker capacity of 3000 tons, or about 75 to 100 carloads.

Water is supplied from two 125 foot walls. In one of these is a centrifugal pump, with a 10 inch discharge, and in the other a vertical centrifugal pump with 12 inch discharge. Each pump is driven by a 100 h.p. motor. The plant equipment requires thirty-eight 440 volt motors, making a total connected load of about 1800 h.p.

Rhodes-Jamieson Builds New Plant at Eliot, California

Early in April of this year, the Rhodes-Jamieson Company, Oakland, California, placed a large sand and gravel plant in operation at Eliot, California, which is situated about 3 miles east of Pleasanton, on the valley line of the Southern Pacific Railway, and 35 miles from Oakland. This plant has a capacity of 1,000 cubic yards per eight-hour day, and is built according to this company's long experience in sand and gravel operations. For a period of about nine years, the Rhodes-Jamieson Company operated a dredge in Napa Creek for the production of gravel. The demand for this material steadily increased, and the supply at that location was gradually being exhausted, so that it became necessary to look elsewhere for a gravel supply.

Prior to purchasing the property at Eliot—which is 127 acres in area—the Rhodes-Jamieson Com-

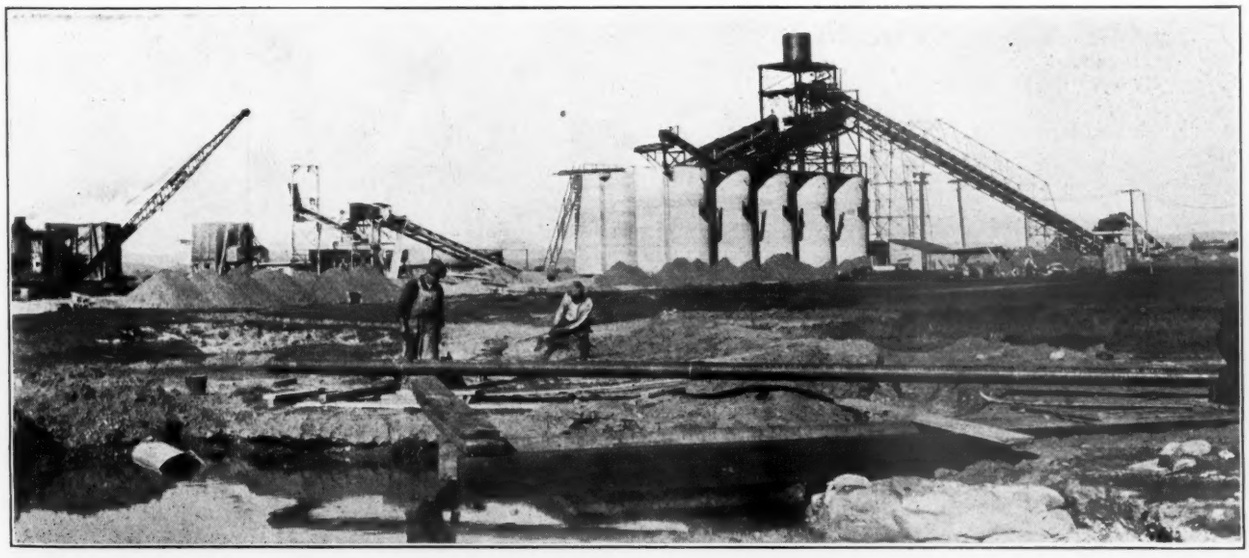
Gravel Pits Showing Two Steam Shovels at Work in the Pit.

Locomotive Crane Excavating Lake for Rhodes Jamieson

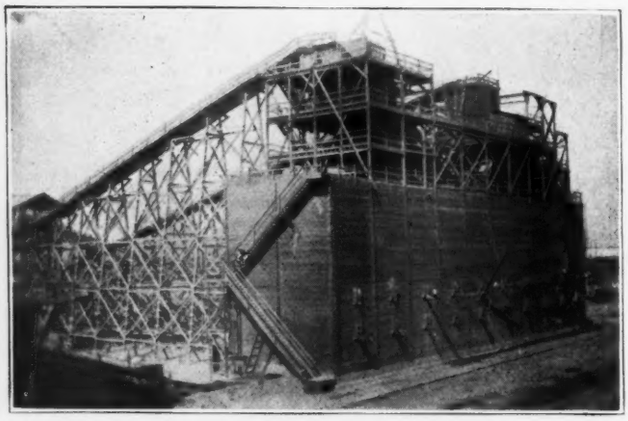
pany made several test borings 50 feet in depth to determine the quality and quantity of material. To their satisfaction, they found a good, hard, well-graduated material, with no clay stratas. The method of excavating at Eliot is a distinct novelty among sand and gravel operations, because it is an application of dredging to a dry deposit. After the property was purchased, the first problem confronting Rhodes-Jamieson Company was that of a water supply sufficient for their needs. There being no other sources, a 500 foot well was bored by the Western Well Works, Inc., of San Jose, California, who also installed the deep well pump and motor, which gives them 1,100 gallons of water per minute. While boring, it was discovered that the gravel was 495 feet deep, with very few clay stratas.

The dredger which was built by Rhodes-Jamieson Company was constructed on the Eliot property. A small lake was excavated by a Brownhoist locomotive crane, after which the dredger was skidded down into the excavation. The pit was then filled with water, and the dredger floated.

The dredger is equipped with a 12 inch American Manganese steel pump, which is driven by a 400 h.p. General Electric motor. The gravel is forced through a 1,000 foot pipe line to a dewatering box. After leaving the dewatering box, the gravel is separated in a 60 inch by 18 foot scalping screen manufactured by the Bodinson Manufacturing Company. All gravel passing through a 1¼ inch opening, drops immediately onto a 24 inch belt conveyor, which carries the gravel into separating screens on top of the gravel bins. The



The New Plant of Rhodes Jamieson at Eliot



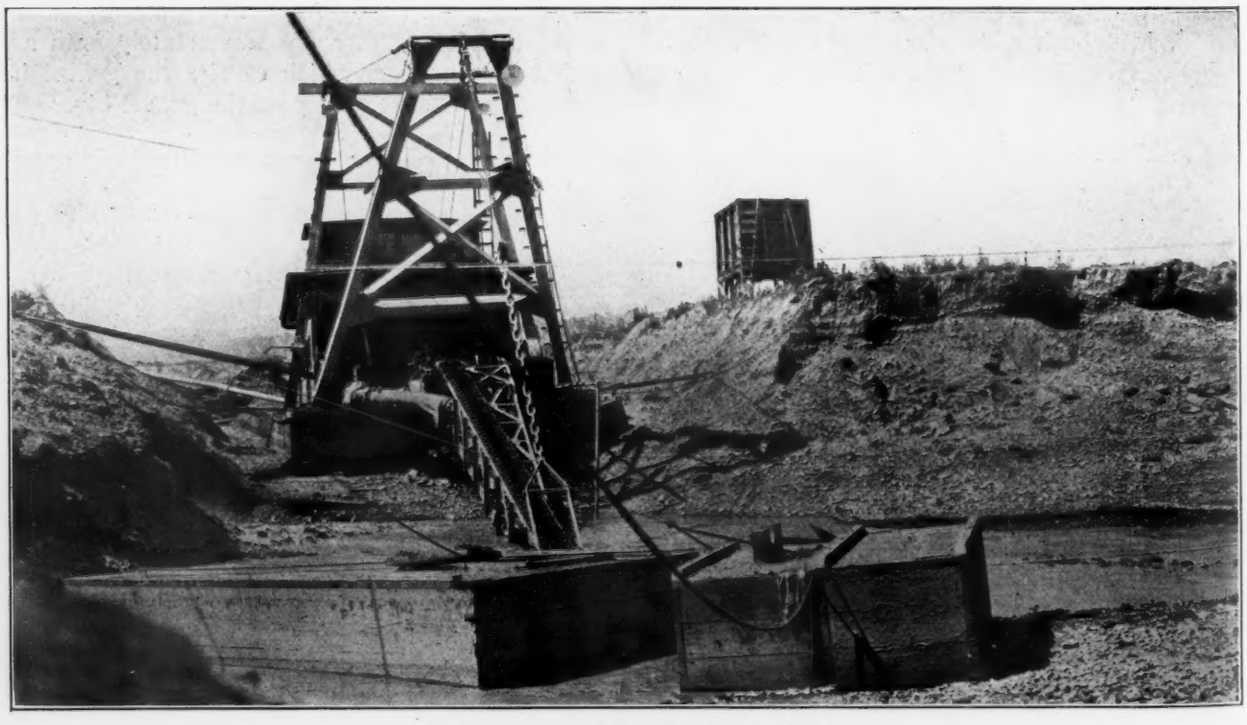
The Reliance Rock Storage Bins

oversize gravel is crushed by a Kennedy-Van Saun gearless crusher, number 94. A 36 inch Symon disc crusher is also used as a secondary crusher. After passing through these crushers, it is carried up into separating screens on top of bins, by means of a 24 inch belt conveyor. The material is separated by two sets of conical screens, supplied by Link-Belt Meese & Gottfried Company. After passing through the screens, the material is separated into five different classes, and drops immediately into concrete storage bins.

There are ten of these bins, each constructed of reinforced concrete and steel with walls 7 inches in thickness, and measuring 20 feet in diameter by 40 feet deep. The capacity of each is 400 yards. The bins are arranged in pairs—one side being used for the screened gravel, and the opposite side for the crushed gravel. The material is taken out of the bins through an opening near the bottom, placed on a 24 inch mixing belt, and carried to the cars. The average loading time is about 11 minutes per car. This plant has one mile of spur track with a field storage capacity three-quarters of a mile long. The spur track is so arranged that cars are switched in by the Southern Pacific Company's switch engine past the tanks on either side. The tracks have a 1 per cent grade from the plant to the main line, which eliminates the use of a locomotive in switching loaded cars to the main line.

Rhodes-Jamieson Company plan to reclaim gravel to a depth of one hundred feet at least. The formation of the gravel was found to be such that it would not readily cave, and, therefore, it was necessary to resort to the process of dynamiting in order to loosen the gravel. They found that by the use of powder, they were able to increase their production 50 per cent with very little additional cost, thereby keeping the plant in operation at 100 per cent at all times. The process of reclaiming the gravel at this plant is something new for the Pacific Coast, but is used extensively in a number of the eastern states. Other plants reclaim their gravel by the use of different types of drag lines, steam shovels, etc., but the past experience of Rhodes-Jamieson Company has proven that the dredger is an economical method of reclaiming gravel.

The Rhodes-Jamieson Company also operates sand dredges on the Sacramento River, and in the vicinity of Rio Vista, California. Their river operations require a fleet of four tugboats and twelve barges. At the present time, this company is operating six retail distributing yards, and has recently purchased a suitable location in East Oakland, for an additional retail unit. The present yards are in Oakland, Alameda and Berkeley. The Rhodes-Jamieson Company plant at West Alameda



The Dredge Operated by Rhodes Jamieson

is exceptionally well equipped, and because of the excellent facilities at that yard, it is contemplated to operate it entirely as a wholesale distributing point. The officers of the company are: G. G. Jamieson, president; A. G. Rhodes, vice-president, and G. L. Richards, secretary and treasurer. Captain A. I. Markwell is superintendent.

Reliance Rock Company Operates the Largest Single Plant

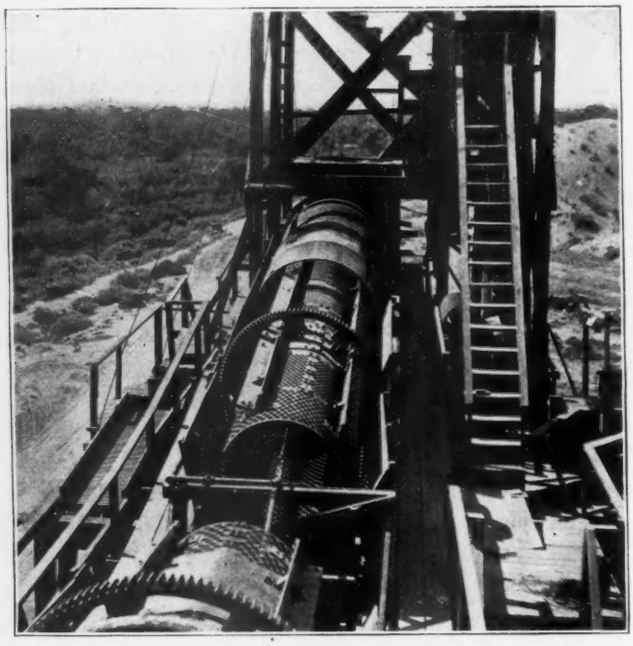
Perhaps the largest sand and gravel plant on the Pacific Coast of the recent plants is that of the Reliance Rock Company of Los Angeles. It is really more of a crushed stone plant than a sand and gravel plant because a large part of the bank run is made up to boulders which must be crushed.

The plant is located in the San Gabriel Valley some twenty miles east of Los Angeles, and near Azusa, California. It is on the main line of the Santa Fe Railroad and is also served by the Pacific Electric. The interesting feature of the plant is the fact that 500 tons of gravel is taken each hour from a 100 foot face of a granite gravel deposit.

The pit was opened in February of 1925 and the material first loaded by means of an old Bucyrus steam dragline mounted on railroad trucks and operated on rails. The pit was arranged so that the dragline dumped into a hopper from which the material was loaded to a steel car for transportation to the crushing plant. After a short time it was seen that the material could be handled more conveniently by a steam shovel. The loading problem was studied and two Bucyrus 80-B steam shovels mounted on caterpillars and equipped with 2½ yard buckets were placed in operation in June. The greater flexibility and increased loading capacity quickly justified this move.

At the present time a shovel is working on each side of the hopper. This hopper is built of wood and has a capacity of fifty tons. It is about 24 feet above the quarry floor and is mounted on skids and rollers. It straddles the tracks leading to the crushing plant and moves along with the shovel as required. A 50 ton quarry car of special design is loaded from the hopper and hauled about 1200 feet to the crushing plant. The round trip of this car can be made before the hopper is fully loaded. The shovels loaded direct from the bank from June until November of last year. It then became necessary to break the bank down by a stream of water. This was accomplished by attaching a nozzle at the end of a hose to the shovel dipper and swinging the machine across the face of the bank. The water flows into the pit and drains off rapidly without causing any trouble. Under these conditions the two shovels have been handling an aver-

Steam Shovels Loading Into Field Hopper at Reliance Rock Quarry Company's Plant



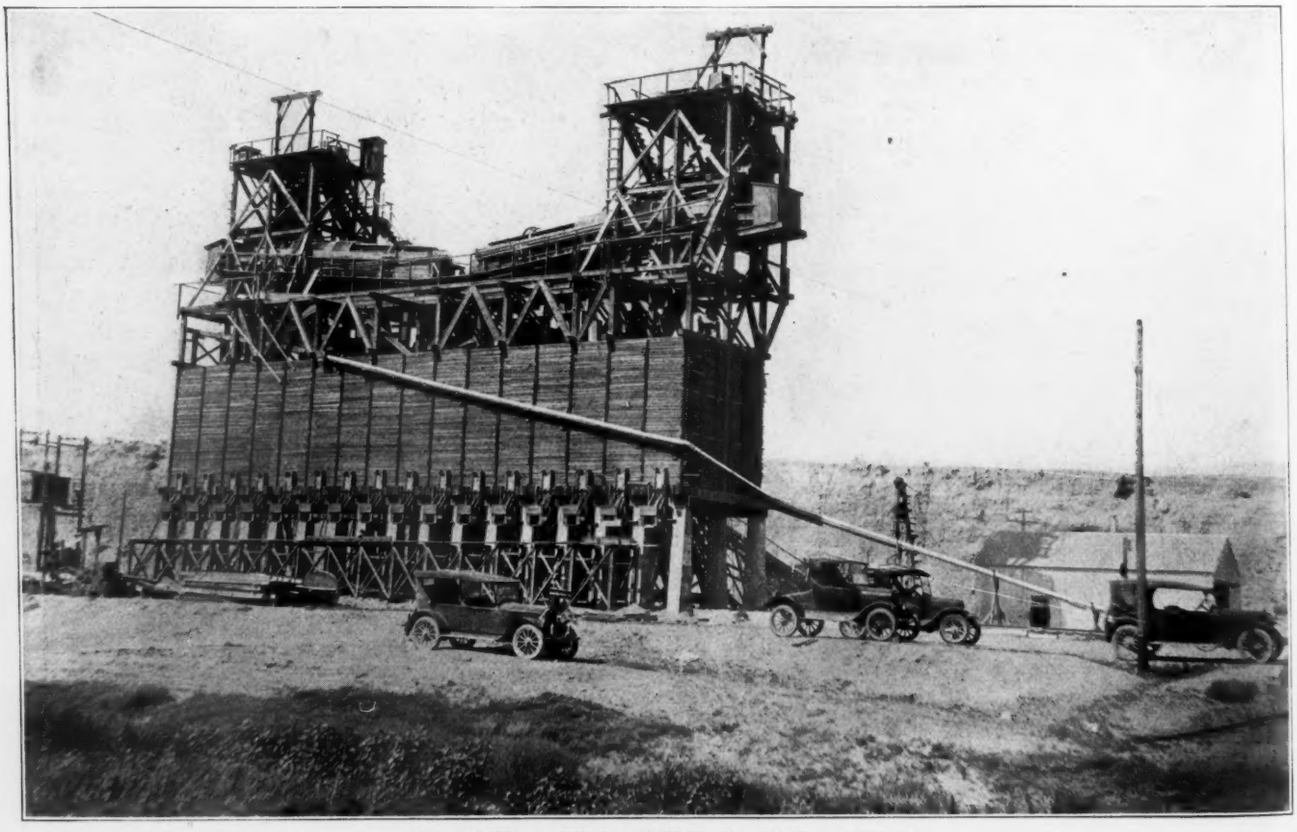
One of the 48 Inch by 42 Feet Screens at Bakersfield Rock and Gravel Plant

age of 500 tons of rock per hour. An efficient inspection system concerning the shovels is interesting. The shovels are shut down twice a day for a period of six minutes and the entire shovel crew jumps in and gives the machine a complete oiling and greasing.

The 50 ton quarry car is hauled into the crushing plant upon an incline of about 30 degrees by a 1½ inch cable and a single drum two-speed hoist operated by a 300 h.p. electric motor. The material is dumped over a grizzly and into a number 15-N Allis Chalmers gyratory crusher. From this crusher the material passes to two 5 by 20 foot revolving screens. The material passing these screens is sent to any one or all of four Allis Chalmers six inch crushers. From these crushers the material passes, is conveyed by two 36 inch belt conveyors to a series of 22 Hummer screens. The oversize from these screens is sent through two more six inch Allis Chalmers crushers and a pair of 20 by 40 inch Allis Chalmers rolls. The sand and gravel is taken out by six cylindrical screens 4x5x9 feet. The rock is delivered from these last screens to storage bins of which there are eleven each with a capacity of 1000 tons. Outside storage is also available and two Brownhoist locomotive cranes equipped with clamshells are used for reclaiming. A 50 ton Davenport locomotive is used.

Bakersfield Rock and Gravel Company Operate New Modern Plant

California has also recently added to its long list of modern plants the new sand and gravel plant of the Bakerfields Rock and Gravel Company at Bakersfield. The material in this new pit consists of various kinds of rocks, including diorite, trap rocks, quartz and a small percentage of more or less altered granite. Now and again a gangue from vein fillings which carries values in gold and silver is found. The sand contains a small amount of gold. The percentage of this gold can be determined by a milling test, and such a test will be made as soon as a well is completed which will



General View of Bakersfield Rock and Gravel Plant.

insure sufficient water for washing purposes. The first well drilled to a depth of seventy-five feet failed to produce enough water for washing purposes, so another well is being sunk. Preliminary tests made by the Raymond G. Osborne Laboratories show the pit contains 53 per cent material larger than 1½ inches and retained on ¼ inch and 32 per cent passing ¼ inch. About 20 per cent of the material would be retained on a 4 inch screen and 33 per cent on a 3 inch screen.

The material excavated by a 2½ yard Bagley scraper operated by a 100 h.p. two-speed Thomas hoist. The scraper discharges to a pan feeder, which in turn feeds to a 30 inch belt conveyor. The belt conveyor, which is 156 foot centers, delivers to the scalping screen. The gravel is taken out here and discharged to an elevator which delivers to a scrubber, and then to a 42 foot screen where it is separated into the different sizes. The oversize goes to a 36 inch Symons disc crusher. The rock from the scalping screen is sent to the different crushers. The oversize goes to a 12x24 inch Cedar Rapids crusher and the 4 inch material to a No. 4 Allis Chalmers "Gates" crusher and the 3 inch material to the 26 inch Symons disc crusher. The crushers are so placed that any size from the scalping screen can be sent to any crusher, and all large sizes of material for which there is no demand can be returned from the long screens to be recrushed. The material passes through the crushers to a continuous bucket elevator, 18 inches wide and 80 foot centers, which delivers to a centrifugal separator and then to the 42 foot rock screen where the different sizes are separated. The oversize from this screen goes back to the Symons disc crusher. The sand, after passing over the gold riffles is sent to a Bodinson classifier for cleaning and grading.

The screens are of special design and were built by the Standard Boiler and Steel Works of Los Angeles. They are 48 inches in diameter and 42 feet in length. There are two such screens, one for gravel and the other for the rock. Both of these screens have 10 foot scrubber sections in the upper end. The scrubber section is a solid steel barrel, 48 inches in diameter and 10 feet long, built of ½ inch steel plate and containing a series of 10 inch screw flights with eight lifting flights placed between the screws in the circumference of the barrel. The next section of these screens contains 15 feet of 9/16 inch perforations, then three feet of 7/8 inch perforations, next three feet of 1⅛ inch perforations, next three feet of 2 inch perforations, then four feet of blank space for gear and tire and finally 14 feet of wire cloth for the sand jacket. All perforations except the sand jacket are round. The scalper screen is 48 inches in diameter and 20 feet in length. This screen has six feet of ⅝ inch perforations, four feet of 1½ inch perforations, four feet of 3 inch

View From Bluff East of Bakersfield Rock and Gravel Plant. Plant is about 80 Feet High. A 30 inch Belt Conveyor in Foreground.

perforations, three feet of 4 inch perforations and blanks to cover gears and tires. At the head of each elevator there is a scrubber of special design, consisting of four manganese steel paddles set between two steel discs revolving at the rate of 400 r.p.m. These paddles cut the stream of material 1,600 times per minute.

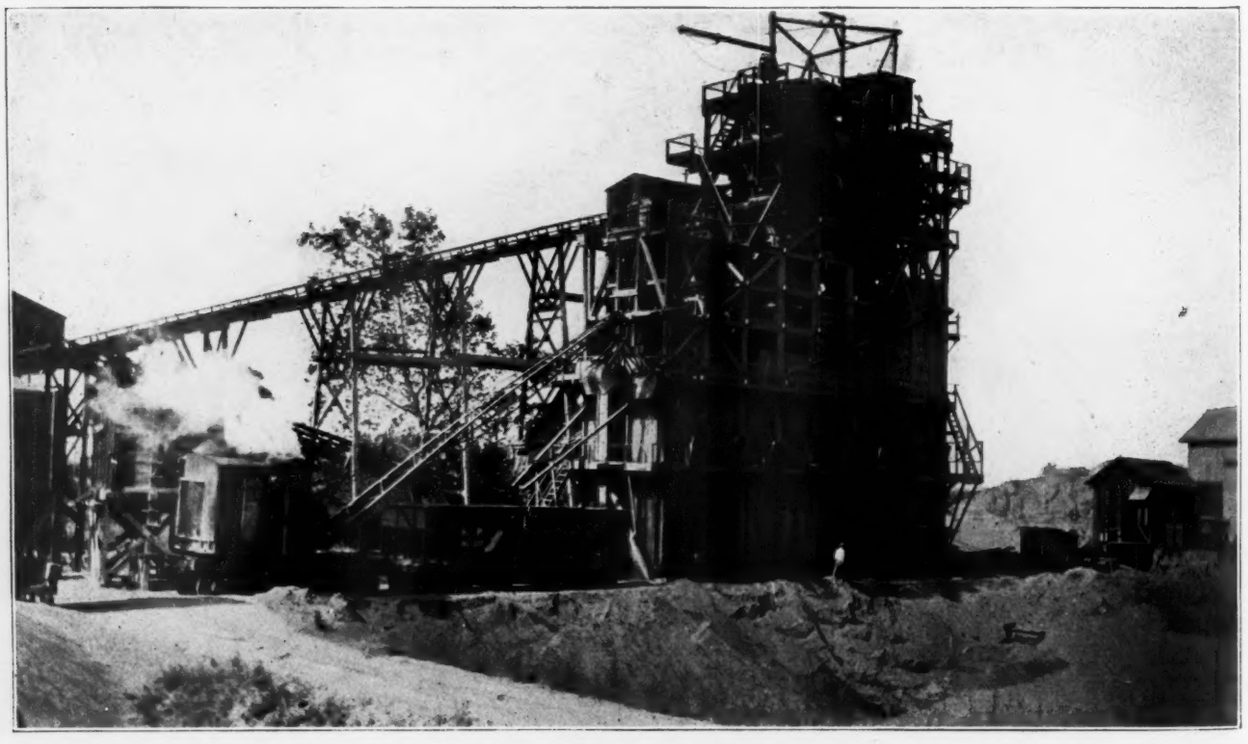
The bunker foundation is 105 feet long, 4 feet wide and 4 feet deep. On top of this base are 34 columns, each containing 8 bars of ¾ inch steel reinforcements running from the top of the columns to the bottom of the bunker foundation. The columns are 36 by 24 inches at the base and 24 by 18 inches at the top. They are 14 feet in height. There are 17 columns to a side set 6 feet 4 inches centers. The bunkers are cribbed with 2x6 sides and ends which are tied every 6 feet 4 inches with 2x4 cribbed partitions, making a total of 16 pockets 20 feet high, 18 feet 6 inches long and 6 inches wide. The wall plates are 16x16 with 8x16 joists set edgewise and without spacing, except where a space of 12 inches has been left for the gates. The joists have a clear span of 17 feet. There are 16 slide gates in the bottom of the bunkers and 16 rack and pinion gates on the side. It is planned to install a 24 inch mixing conveyor belt, 160 foot centers, under the side gates for mixing and loading material to cars. All the equipment for this conveyor is on the ground and will be installed as soon as the scales are in place.

A vast amount of material has been removed with a steam shovel, leaving a bank nearly 1,000 feet in length with an average height of 40 feet. The plant has a capacity of 100 tons per hour and there is ample room for ground storage. The Bakerfield Rock and Gravel Company was organized and financed by C. F. Smith and the plant was designed and built by J. R. Hughes. The officers of the company include A. H. Harpe, president; J. B. Dowd, vice-president, and C. F. Smith, secretary-treasurer.

Niles Sand, Gravel and Rock Company Make Improvements, Plan New Plant

The Niles Sand Gravel and Rock Company of San Francisco has made extensive improvements and additions during the past year at the Niles Plant. These additions include a double installation of scrubbers and preliminary screening devices. The pumping equipment has been enlarged so that a volume of approximately 2500 g.p.m. is now being used. This company lays particular stress on well graded, clean materials and extreme care is taken to produce such a product. Mr. William H. Ford, who owns this company also operates the River Rock Gravel Company, located on the Western Pacific near Tracy, California, and the Riverbank Sand Company, located near Escalon, California, on the A. T. and S. F.

A new plant is to be constructed near Coyote, California, on the Southern Pacific Railroad, on extensive holdings at that point. The spur track and well are now completed at the new location and construction work will start on the plant shortly. The new plant will have a capacity of 250 tons per hour and will be constructed along the most modern lines. The plant will be of the conveyor belt type, with a separate crushed rock plant. A boom dragline will be used for digging operations. J. C. Buckbee, Chicago, who designed the Niles plant has designed the Coyote plant.



The Niles Sand and Gravel Plant

PACIFIC NORTHWEST GRAVEL PLANT NOTES

Portland Sand and Gravel Company Produce at Low Cost

One of the largest sand and gravel operations in the vicinity of Portland securing material from a dry pit is the Portland Sand and Gravel Company. This is a new operation which is located 6 miles east of the center of Portland, Oregon, in the residential district. The plant is owned and operated by A. F. Saar.

Before installing his plant, Mr. Saar had the tract thoroughly prospected disclosing that the deposit was of good material for 90 feet deep over the entire 7 acres and every indication shows that it continues to a much greater depth. The best materials are found around the 50 foot mark. However, the present operations are extending to the 70 foot level. After all the available material has been removed above this level, it is planned to lower the derrick and take out a second lift of 30 feet, which will carry the excavation to 100 feet below the ground level. The Smith and Watson Iron Works of Portland made a special hoist to operate the derrick excavator. This hoist has 4 drums mounted on one frame and is driven by a 75 h.p. Allis-Chalmers motor. Two drums swing the derrick, another raises and lowers the boom and the fourth handles a 1½ yard Hayward clam shell bucket.

The Storage and Screening Plant of Portland Sand and Gravel Right on a Section Line Highway

Picking up its load from a pit alongside the face, the bucket undermines the bank causing plenty of

The Pit of the Portland Sand and Gravel Company Located Six Miles from Center of Portland, Oregon.

Trestle Leading from Pit to Screening Plant and Storage Bins at Portland Sand and Gravel Company

material to keep coming to the clamshell. The excavated material is lifted about 35 feet and dumped into a car resting on a trestle extending down into the pit. The car body is hoppered in shape with a capacity of 3 cubic yards. When full, it is drawn up the 25 per cent trestle incline to the bunkers by another Smith and Watson hoist operated by a 30 h.p. Allis-Chalmers motor.

Bottom dumped from the hoppered car, the material falls into one of the two small bins which regulate the flow onto a grizzly which rejects all rock over 2 inches in size. Below the grizzly is a 48 inch by 10 foot revolving screen installed by the Phoenix Iron Works. Water is sprayed onto the material as it enters the screen. After having served its purpose as a washing agent, the water is caught in troughs and carried to a 2,000 gallon settling tank from which a portion is reused for washing purposes and the balance used to carry off the sediment. A 3 inch centrifugal pump either returns the water for washing or pumps off the sediment as desired. The settling tank might seem to be superfluous but it saves considerably on the use of metered city water.

The material rejected by the grizzly falls into a number 9¾ Acme jaw crusher which reduces it to 2 inches or smaller. Another Allis-Chalmers motor of 30 h.p. rating operates the jaw crusher. All material from the screen as well as that from the crusher is led by gravity to one of the ten compartments giving a bunkering capacity of 1,350 cubic yards.

The removal of the two or four feet of earth overlying the deposit or excessive washing to remove it from the excavated material is obviated due to a call for road gravel from Multnomah county. When stripping seems necessary, the top is excavated by the clam shell bucket and mixed a few buckets at a time with the clean material from the pit. It is then handled like the regular pit run excepting that it is not screened and only enough water is added to cause it to run into the proper bin.

This plan has turned out 300 cubic yards in a working day of 8 hours but is generally averaging a little better than 200 cubic yards, for the same period. Electricity for operation of motors is taken from the lines of the Portland Light and Power Company which furnishes electricity for power purposes at low rates depending upon the quantity consumed.

Heney Sand and Gravel Company Adopt Hydraulic Method

The Heney Sand and Gravel Company operates a plant on Maury Island about twenty miles south of Seattle. The deposit they are working is of considerable height, being 360 feet above mean low water, and is of a somewhat compacted composition running heavily to sand. The nature of the deposit makes it possible to work this plant by the hydraulic method, on account of the face worked being quite high, about 200 feet, and the formation somewhat hard. A monitor is used for tearing down the bank and furnishing the water to carry the sand and gravel down the flumes.

One main flume, set on a 12½ per cent grade, leads from the pit to a point a short distance from the bunker, where it is split, feeding two flumes that lead to the two revolving scalping screens. These scalping screens are made up of Manganese Steel Forge Company's Rolman double lock mesh woven manganese steel rods on 2⅛ inch centers. They reject the coarse gravel and oversize, and pass everything under 1½ inch. The oversize and coarse gravel travel from the scalping screen over a stationary screen, which removes the coarse gravel. The coarse gravel is flumed to a storage bin. The oversize is discharged direct to the crusher, where it can be accumulated and crushed later.

The crusher reduces the oversize to 2½ inch and under. This product is elevated by a bucket conveyor and dumped into the coarse gravel and goes with it to the storage bin. The material which passes the scalping screens travels forward about fifty feet, where it is discharged to the main separators. The main separators are made up of a series of screens 4 inches wide, mounted on a frame set at a 3 to 2 slope. This frame is completely housed in, and is suspended by four chains,

one at each corner. The back end of this frame carries a rod to which is fastened a lug. This lug is engaged by a cam on a motor driven cross shaft. This pulls the entire frame carrying the screens back about six inches, when it is suddenly released. The frame swings on the chains and strikes a bumper at the front. This produces a jarring action which is repeated about seven times per minute. The jar keeps the screens clear and the material moving forward.

Three kinds of sand are produced, i.e. plaster, building and paving. The plaster sand is positively separated through screens, while the other two are separated by gravity settling boxes, and the proper grading obtained by remixing. Four grades of gravel are produced: 3 to 1½ inch, 1½ to ¾ inch, ¾ to ¼ inch, and ¼ to ⅛ inch. The various demands of customers are taken care of by remixing.

Cars drawn by an electric hoist are used for loading the barges. The tipple is an overhead truss arrangement, the barges going into the slip underneath, the cars dumping through the truss. The pumping plant consists of two 10 inch De Laval pumps in series direct connected to a General Electric 200 h.p. induction motor between the pumps. They supply 220 g.p.m. against a total head of 270 feet.

Superior Sand and Gravel Company
Reconstruct Plant at Friday Harbor

The Superior Sand and Gravel Company operate an efficient plant at Friday Harbor, Washington, producing about 100 yards per hour. The plant is in Puget Sound on San Juan Island. This plant was formerly operated by the San Juan Gravel Company. It was reconstructed early this year by the Superior Sand and Gravel Company.

The deposit slopes to the waterfront and the face rises to a height of 400 feet. The bunkers and screening plant are on the shore line at the foot of the slope. The hydraulic method is used in all handling. A hydraulic giant with water coming through a six inch pipe line cuts a 100 foot face. The material is washed into two parallel flumes by a 3½ inch hose which receives its water supply through a 10 inch pipe line. The two flumes are each 16 inches wide at the bottom, 350 feet long and 1 foot high. Water for sluicing is supplied by two steam pumps of 800 and 1,500 gallons per minute capacity. The pumps are located at the water line and deliver to the pit through the six and ten inch line previously mentioned which are 450 feet long. The total lift is 100 feet.

The material coming into the plant passes over a 4 inch grizzly. The oversize is deflected to an outside dump. The material passing goes to a series of gravity screens and separations from 3½ inch down to pea gravel are made. The sand is separated out by sand jackets and sluiced to the settling boxes. The various sizes of gravel drop directly to their respective storage bins.

The various sizes are discharged from the bunkers through chutes to a 120 foot Goodrich belt conveyor which in turn discharges to a 350 foot Goodrich belt scow loading conveyor that extends out over deep water to the dock where the scows are loaded.

Pioneer Sand and Gravel Company
Increase Plant Output

The Pioneer Sand and Gravel Company, have not made any alterations at their Pioneer pit for the past two years other than the installation of an electric shovel and auxiliary apparatus. The new shovel is a Marion model 125-E. Formerly their stock pile of raw material was built up by 10 yard cars loaded direct by the shovel and dumped from a trestle. The cars operated independently of each other, one going up the incline while the other was under the shovel. This gave them an output of 250 yards per hour. It was desired to increase this output considerably, and at the same time cut the operation cost. With this in view, the Marion was purchased, which it is estimated will give them 400 yards per hour. The shovel is equipped with Ward-Leonard control, is full swing and mounted on caterpillars. It carries a 3½ yard bucket, on a 30 foot stick and a 45 foot boom. It will clean up 34 feet at grade and dump 54 feet from center line.

As 250 yards an hour with the haul formerly in use, and the cars operating independently of each other, was working the hoist to its limit, other means had to be provided for hoisting more material. This was accomplished by installing a double hopper at the foot of their incline which is fed by a 125 foot conveyor and hopper that pivot around the double hopper as a center. The cars were then counterbalanced by reversing the lead, friction and brake on one drum of the hoist and setting and locking the frictions with one car at the top of the ramp, and the other at the bottom.

The double hopper is provided with large doors which are opened and closed by the car as it goes under and leaves the hopper. Five seconds are required for loading a car. The sides of the car were raised and their capacity increased to 13 yards. New gears were installed on the intermediate shaft of the hoist, which resulted in an increased drum speed of 33 per cent. Counterbalancing the cars made it possible to increase the hoist speed with scarcely any additional load on the motor.

By using the conveyor and hoppers, the shovel can load and the hoist can elevate to maximum capacity, as both are quite independent of the other. The conveyor and larger shovel have made it possible to clean up 205 feet each side of the center of the incline. This clean up when used on

a 200 foot face such as they are working, greatly increases the yardage available at one set up, and means a material saving in their operation.

Changing to this operation has been taking place the past summer and the Pioneer Sand and Gravel Company feel quite confident that after a few more minor adjustments are made, they will be getting 400 yards per hour and their production costs will be considerably diminished.

The deposit near Steilacoom known as the Pioneer Pit is situated on the shore of Puget Sound, thirty miles by water from Seattle and eight miles from Tacoma. The plant is equipped with two bunkers for shipping by rail and two for shipping by water. The combined bunker storage is 3,000 cubic yards. All grades of sand and gravel are produced except plaster sand which is secured at another pit near Seattle.

An interesting feature of the operations of the Pioneer Sand and Gravel Company is the marketing of mixed concrete. Any quantity, up to 200 yards of concrete, can be delivered anywhere from 10 to 40 miles within eight hours. "Tru-mix concrete, ready to pour, proportions guaranteed" is the slogan under which this service is sold. A central mixing plant, a locomotive crane, a truck crane, a cement warehouse, six gravel pits, a fleet of barges, a fleet of 50 motor trucks and a dependable working organization make this service profitable.

The essential piece of equipment is the mixing plant. It consists of a Koehring mixer, a Blaw-Knox batcher plant and inundator, and 70 yard storage bin for aggregates. The square funnel-shaped bin, or the "top floor" of the plant is divided into four compartments so that four sizes of aggregate can be stored there, always available by gravity through chutes opened by the operator in charge of the mixing plant. Each compartment has a capacity of 17½ cubic yards. Paving sand is kept in one, building sand in another, paving gravel in the third, and building gravel in the fourth.

These compartments are filled from the near-by stock piles by a Link-Belt locomotive crane operating a 1¾ yard Blaw-Knox clamshell bucket.

Cement for the mixing plant is stored on a platform built out from one side of the elevated aggregate bin, so that the cement, as well as sand and gravel, is carried down to the mixer by gravity. The crane swings the cement up to the platform on trays. One tray only, holding 64 sacks, is placed on the platform at a time.

Scales are provided on the platform so that when a fraction of a bag of cement is needed, exactly the right amount can be weighed out quickly. Cement, when ready for the mixer, is dumped into a metal pipe chute, which takes it straight to the drum of the mixer below. Heavy canvas drops are provided on the three open sides of the cement platform to protect workmen and materials from the weather.

Directly below the aggregate storage bins is the "charging" floor of the mixing plant, where aggregates are measured before going into the mixer. Each of the four compartments containing aggregates is equipped at the bottom with a trap door, so arranged that both compartments containing sand can be opened into the inundator, while the gravel sections open into another measuring hopper.

Both the inundator and the gravel hopper are easily adjustable for varying amounts of the aggregate. This is essential, because the mixing plant may be called upon to fill an order for one yard of 1-2-3 mix, and the next minute for a half-yard of 1-2½-5 mix. The equipment provided enables the operator to put into the mixer the correct proportions of material without waste of time.

The inundator, which is a cylindrical container for sand, somewhat like a batch hopper, is provided with a movable bottom which is forced up or down by a screw. A few turns of a wheel on the bottom of the big bucket, forces the bottom farther up so that the amount of sand it will hold is less. The variations in the amount of sand due to bulking can be eliminated by inundating the sand as it flows into the bucket from the hopper above.

The gravel is measured in a square batch hopper which is constructed like a telescope, so that the outside wall and bottom slip up or down over the inside wall, thus carrying the capacity of the hopper. The bottom part of the hopper is hung on steel cables which lead to a windlass. When it is desired to change the capacity of the hopper, a turn of the windlass moves the bottom up or down as desired.

The stone batch hopper empties through its bottom, but the inundator (a cylindrical container) tips over to discharge its contents. The reason for this is that water is first admitted to the inundator from a water charging tank close by. This tank contains just a certain amount of water, getting its supply from the main water line. There is also an excess water tank which empties directly into the mixer. The operator watches that tank so he can shut off the water when it is full. The two tanks hold the exact amount of water for any specific concrete mix, the excess tank being set for the correct amount of water needed to complete the batch.

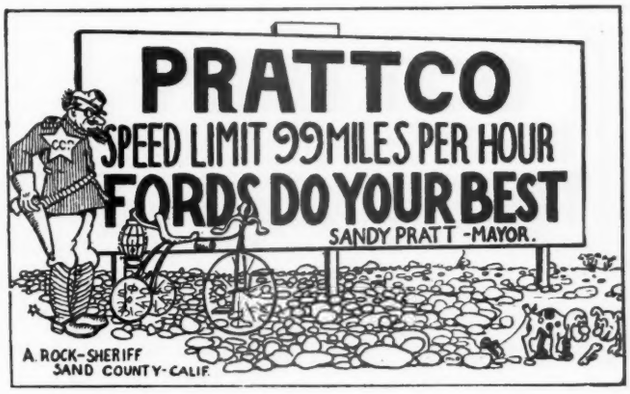
As soon as the operator notices an overflow from the excess water tank, he shuts the valve. Too much water can never be added. The operator then opens the rapid discharge valve from the water charger, allowing all the water to drain into the inundator. He then starts sifting the sand into the inundator and when it is full, strikes off by

(*Continued on page 106*)

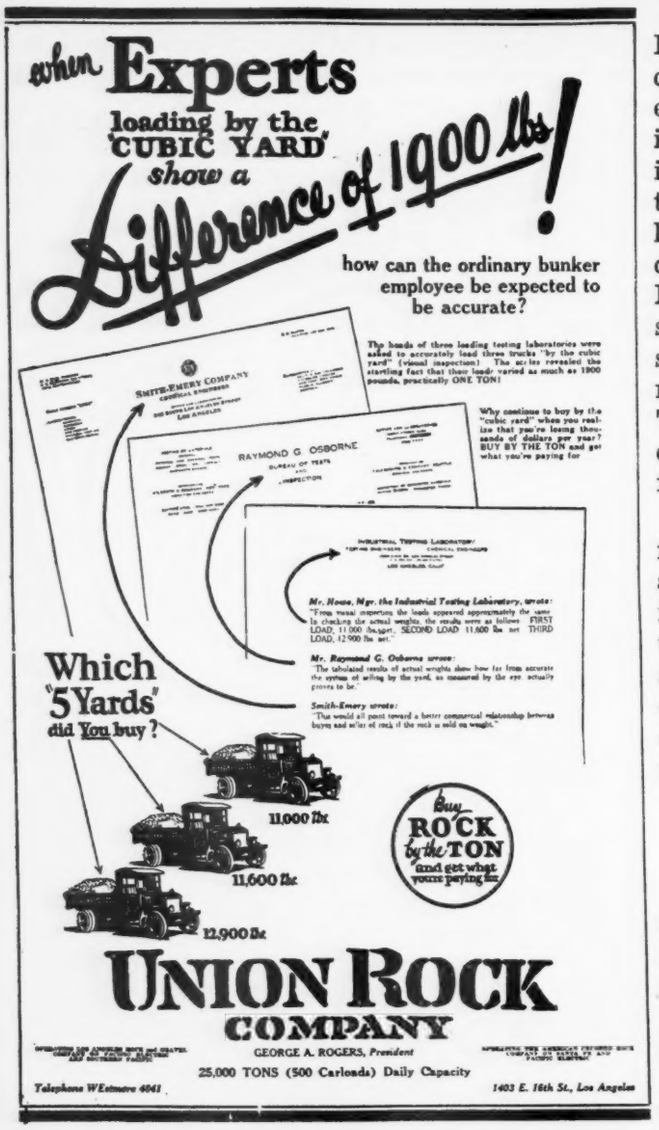
PACIFIC COAST PRODUCERS ADVERTISE

MORE and more sand and gravel producers and especially on the Pacific Coast are utilizing various forms of advertising to win new customers and create a wider appreciation throughout their territories of the advantages of using clean, properly graded materials for paving and building construction. In the case of the Stoney Creek Gravel Company, Orland, California, more than a little of the credit for the year-around capacity business enjoyed by this plant is due to the progressive advertising policy of the manager, H. S. Twede. Of course, the company has a splendid plant for preparing all sizes of material to meet the demands of its trade, and the plant is well located for shipping to most centers of building activity in northern California. The wise use of various mediums of publicity has enabled the company to make known its exceptional facilities to prospective customers throughout its trade territory in a much shorter time than usual.

From the time the plant was ready for business two years ago until the present day, Mr. Twede has been a consistent advertiser and keeps his eyes open all the time for any new advertising idea that might be applied to his business. His latest publicity move and one that he believes will bring especially good returns is the taking of a moving picture showing how sand and gravel is excavated, prepared for the market, loaded into cars and delivered onto the job. The picture starts by showing the company's gravel bar with the river in the foreground and the plant in the distance. The bucket of the Sauerman slackline cableway excavator is seen rising out of the water with a heaping load of gravel, speeding up the track cable to the top of the plant and discharging its load into the hopper, then coasting back down the cable to pick



Sandy Pratt Has Placed the Lower Sign Near a Fashionable Hotel and Has Stickers for Windshields Made from the Illustration at the Upper Right


when Experts
loading by the CUBIC YARD show a Difference of 1900 lbs!
how can the ordinary bunker employee be expected to be accurate?
SMITH-EMERY COMPANY
RAYMOND G. OSBORNE
Mr. Howe, Mgr. the Industrial Testing Laboratory, wrote:
Mr. Raymond G. Osborne wrote:
Smith-Emery wrote:
Why continue to buy by the "cubic yard" when you realize that you're losing thousands of dollars per year? BUY BY THE TON and get what you're paying for
Which "5 Yards" did You buy?
11,000 lbs.
11,600 lbs.
12,900 lbs.
Buy ROCK by the TON and get what you're paying for
UNION ROCK COMPANY
GEORGE A. ROGERS, President
25,000 TONS (500 Carloads) Daily Capacity
Telephone WEstmore 4041
1403 E. 16th St., Los Angeles

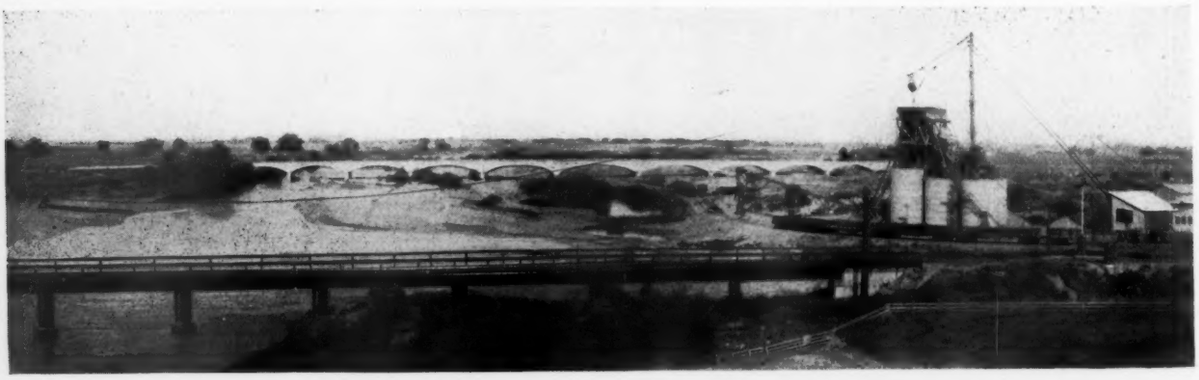
up another load. "Close-ups" are shown of the various details of screening and washing the material, then the loading into cars, and lastly, views of typical jobs where the Stoney Creek products are being used. Arrangements have already been made for showing the film in many moving picture theaters of northern California, and of course it will be a welcome feature at the forthcoming annual gatherings of contractors and highway officials of that district at the All Western Road Show.

The Pratt Building Material Company and the Pratt Rock and Gravel Company of San Francisco have made excellent use of advertising. Clarence Sandy Pratt the president of this company is a firm believer in advertising. The accompanying illustrations are two of many signs which greet the motorist that tours California. Sandy Pratt has erected these signs at his sand, gravel and crushed stone plants at Sacramento, Prattrock, Marysville and Prattco. He has also made up windshield stickers of the California highway scene showing the traffic cop and they may be seen on many an automobile in and around Sacramento. The other sign is lighted at night. It attracts considerable attention as it is placed only two miles from the fashionable hotel De Monte.

The Union Rock Company of Los Angeles, California, is another company which has extensively advertised not only their products, but their service, and methods. The value of purchasing by the ton as compared with the cubic yard has been stressed a great deal. An excellent example of the effective advertising is shown by the illustration of one of these ads which occupied nearly a full page in the Los Angeles Evening Express.

Building Checked in South

Building in the South, according to reports from S. W. Straus and Company, has slowed down. August building permits in twelve states showed a loss of about 30 per cent from August, 1925. From July, 1926, the loss was about 3 per cent. The largest loss in building was in Florida which showed 57 per cent. Gains were reported in Alabama, Kentucky, Mississippi, North Carolina, Tennessee and Virginia. Out of 25 cities, 11 showed gains. Jacksonville showed a gain of 80 per cent; Houston showed a gain in volume but a loss from August; Miami showed a loss of 60 per cent. The total for August for 90 cities reporting was $38,767,722; for August, 1925, $55,693,456; for July, 1926, $40,157,189. The cities showing gain included Birmingham; Dallas, Amarillo, Texas; Knoxville; Biloxi, Mississippi; Wichita Falls, Texas; Danville, Texas; and Covington.



The Plant of the Stoney Creek Gravel Co., Near Orlando, Calif.

PIT AND QUARRY FOREIGN DIGEST

Dolomite Cement History and the Influence of Degree of Burning on Dolomite Lime

Relates the erroneous but honestly mistaken results obtained several decades ago by apparently competent technologists in the utilization of magnesia cements and plasters derived from dolomite; the results seemed to presage a new era in construction but did not work out in practice. (L. Kiepenheuer, Zement, August 19, 1926, p. 578-581. August 26, 1926, p. 591-594)

Some Uses of Quartz and Silica Products in Industry

Gives details with illustrations of grinding and grading of silica and flint, used in pottery, scouring and cleaning products, as an extender of paints, filler for wood and for rubber, etc.; the production of kieselgur, etc. (J. Stewart Remington, The Industrial Chemist (British) August, 1926, p. 347-350)

Carborundum as a Refractory

The following table gives some interesting data on refractories:

Material	Spec. Heat	Heat Conductivity	Crushing Strength
Fire clay-bricks	0.192	0.0034	1,050
Magnesite	0.220	0.0071	4,800
Chromite	0.174	0.0067	3,900
Carborundum (Refrax) ..	0.162	0.0275	12,500
Carborundum (Carbofrax)	0.180	0.0243	14.700
Silica	0.191	0.0020	2,300

Carbofrax is being used for (1) sidewalls, fire bridges and combustion chambers in oil fired boiler furnaces, (2) flues, furnace arches, and chimney constructions for oil fired porcelain furnaces, (3) combustion chambers, arches, vertical and muffle furnaces in the porcelain and enameling industry, (4) hearths, supports and combustion chamber construction which in the usual method are brought to a high temperature very quickly, (5) heat treating furnaces. (B. Kleinschmidt, Technische Blätter, Number 13, 1926, p. 99.)

Some Notes on China Clay

This material is described as to origin, properties, specifications and use in paper making, soap manufacture, pottery, alum and ultramarines. (F. J. Lewis, The Industrial Chemist (British) July, 1926, p. 307-8.)

The Effect of Cements on Metals

Shows that iron imbedded in cement or concrete which has not set is protected by the Alkaline reaction, but if iron is placed in cement which has already set no protection against corrosion is afforded. Zinc is attacked by cement, but decreasingly as the cement is leaner, but in all cases zinc can be protected by a coat of asphalt paint, and various other inert coatings. Tin seems not to be attacked when imbedded in cement. Lead is atacked so must be coated with an inert protective paint, as must also aluminum and copper. (Dr. Walter Obst, Zement, August 19, 1926, p. 552-3.)

The Proofing of Concrete

Describes the proofing of concrete by the three available methods, (a) the integral method, (b) the membrane coating, and (c) the surface coating. The integral method involving adding something to the whole concrete mix, such as slaked lime to render the mass less porous by filling the voids. Another is to add an aluminum soap. The membrane method is to lay down one or more layers of waterproof paper coated with tar, etc. The surface coating consists in the application of solutions to the surface such as water glass, soap, and others. This subject is fully treated in Technologic paper number 3 of the U. S. Bureau of Standards. (Chemical Age (London) Sept. 4, 1926, p. 223.)

Thermal Behavior of Puzzuolana and Its Reaction in the Solid State With Some Alkaline Earth Oxides And Carbonates

In the heating of puzzuolana two critical points are observed at about 550° and 900-1000° respectively. As in the case of kaolin chemical changes cccur at these points. Puzzuolana reacts with barium oxide at the same temperature as does alumina and kaolin and in the same way, it lowers the temperature of dissociation of barium carbonate to the same extent as alumina and kaolin. The behavior of the alumina in puzzuolana towards solutions of hydrochloric acid and calcium hydroxide shows the same characteristics as that of free alumina and the alumina of kaolin when these substances have all been heated to the same temperature. The author suggests that the results indicate the existence of free silica and alumina as the principle constituents of puzzuolana, as a silicate of aluminum would scarcely behave in this way. This would explain the setting of puzzuolana, and in view of the differences in the behavior of silica and alumina according to their origin and treatment, it would also explain the variation in the mortars formed by treatment with lime. (S. Malquori (Gazetta) 1926, 56, 42-51.)

Destruction of Cement Drain-Pipes in Soil

Experiments are described which indicate that when cement hardens in air carbon dioxide first combines with the calcium hydroxide after which the calcium aluminate and then the silicate are decomposed; the silica thus liberated is converted into the insoluble form. When the calcium carbonate

in the cement exceeds 75 per cent the pipes are much more easily damaged. From a detailed examination of two specimens of corroded drain-pipe and the soil from which they were removed (sandy loam) it is concluded that the free carbon dioxide in the ground-water is responsible for the destruction. The calcium compounds in the cement are first converted into carbonate and then dissolved out in the form of bicarbonate. Magnesium compounds, also, may sometimes take part. (K. Nehring (Z. angew. Chem. 1926, 39, 883-887.)

Advances in Gypsum Technology

The advances are chiefly in the nature of introduction of machinery to reduce costs and to render product more uniform. (J. M. Porter, Chemical and Metallurgical Engineering, Sept., 1926, p. 549-550.)

Modern Portland Cement Manufacture

Refers to British practice and British Standard specifications, and the effect on the industry produced by the introduction of aluminate cement. Describes method of obtaining fineness by means of a spirit elutriator. (S. Dickson, Journal of the Society of Chemical Industry, Sept. 10, 1926, 310 T-312 T.)

The Testing of Portland Cement

Discusses standard tests for fineness, standard sand, the Faija "pat test," LeChatelier expansion test, chemical analysis. Dr. Geoffrey Martin discussed the causes of inefficiency in manufacture. (R. H. Harry Stanger, Journal of the Society of Chemical Industry, Sept. 10, 1926, 312 T-315 T.)

(*Continued from page 102*)

means of the automatic strike off gate in the sand compartment above, releases a latch and the inundator dumps itself.

He then opens a valve permitting contents of the excess water tank to flow directly into the mixer, and the inundation process is complete. The stone batcher fills from the bin compartment above. When it is full no more stone will flow into it and the gate is closed. The bottom of batcher is opened by pulling a string and stone flows right into the mixer. This process takes about 40 seconds. All operations are mechanical.

On a level with the inundator, on the "charging" floor of the mixing plant, stands the operator. Here is his telephone booth, where orders for "Tru-mix concrete" are received. Levers at his hand control the supply of aggregate above. A switch starts the huge mixer turning, and a huge lever on one side enables him to pour the mixed concrete from the mixer into waiting trucks. A helper takes care of measuring cement, and takes orders for exact amounts from the operator in charge. Everything is arranged with two ideas in mind—accuracy and speed.

A Koehring mixer with a capacity of 29 cubic feet, operated by an electric motor, mixed the concrete. Every batch is allowed at least one full minute in the mixer. If the order calls for a haul of five miles or more, the operator pours into the mix a quantity of black fluid, which is primarily a waterproofing material but which also, it has been found by experience, keeps the mix in a plastic state for such a length of time that it can be hauled 20 and even 40 miles without becoming set or caked in the bottom of the truck.

When the batch is mixed it is poured from the mixer into a hopper before being dumped into the truck. This hopper holds about 3 cubic yards and has a chute bottom with a trap door. Its use has several advantages—it serves to carry the mix down close to the truck before dumping, so as to avoid splashing and wasting concrete; it dumps the mix into the truck faster than it can be discharged from the mixer, thus saving truck time, and it provides temporary storage for several batches of concrete, so that the operator need not wait for the truck to drive into place before emptying the mixer and filling it with another batch.

Pennsylvania Dixie Cement Stock Now on Market

Public offering is being made of 300,000 shares of common stock of the Pennsylvania-Dixie Cement Corporation at a price of $43 a share, by a group consisting of Lehman Brothers, Hemphill Noyes and Company, Hornblower and Weeks, Cassatt and Company, Caldwell and Company, Mitchell Hutchins and Company and Bond and Goodwin and Tucker, Inc.

Simultaneously offering is made of a new issue of $7,215,300 of series A convertible 7 per cent cumulative preferred stock of the newly formed Penn.-Dixie Cement Corporation at a price of 99 flat by a banking group headed by The National City Company, Hemphill, Noyes and Company and Caldwell and Company, with whom are associated Lehman Brothers, Hornblower and Weeks, Cassatt and Company, Mitchell Hutchins and Company and Bond and Goodwin and Tucker, Inc.

The companies which are being joined in the consolidation are the Pennsylvania Cement Company, the Dexter Portland Cement Company, Dixie Portland Cement Company and the Clinchfield Portland Cement Company, with an aggregate productive capacity of 10,000,000 barrels a year.

Net income available for dividends after deducting interest charges on the bonds and Federal taxes for the three years and seven months July 31 last averaged $3,018,682 or over 3.3 times requirements on preferred stock. For the twelve months ended July 31 last, net income amounted to $3,726,086 or more than four times the preferred dividend requirements.

THE FOLLOWING MANUFACTURERS LIST SOME PACIFIC COAST INSTALLATIOS

Blaw Knox Equipment

The Blaw Knox buckets are well known on the Pacific Coast. The Blaw Knox batcher plants and bins are also found in large numbers. A partial list of Blaw Knox installations on the Pacific Coast are as follows:

Santa Cruz Portland Cement Company, Davenport, California, two 2-yard single line clam shell Blaw Knox Buckets, handling cement clinker on a cableway.

Hollywood Disintegrated Granite Company, Hollywood, California, one 1-yard Dreadnaught Blaw Knox Bucket.

Blue Diamond Company, Los Angeles, California, one 1-yard Dreadnaught clamshell bucket.

Southwestern Portland Cement Company, Victorville, California, one 4-yard Blaw Knox Speedster bucket.

American Sand and Gravel Company, Sacramento, California, one 1-yard Dreadnaught clamshell bucket.

Marysville Sand Company, San Francisco, California, one 1½-yard Dreadnaught clamshell bucket.

Superior Portland Cement Company, Concrete, Washington, one 4-yard Dreadnaught, one 2½-yard Speedster, one 1½-yard Dreadnaught clamshell bucket.

Pioneer Sand and Gravel Company, Seattle, Washington, four 1-yard Dreadnaught, two 1¼-yard Dreadnaught, one ¾-yard Dreadnaught, three 1¼-yard Speedster, one 2½-yard Speedster, Clamshell buckets; 6 circular bins, 1 batching bin.

Henry & McFee, Tacoma, Washington, one 3-yard Dreadnaught clamshell bucket.

Oakland Paving Company, Oakland, California. These people are:

Bradley Pulverizer Company

Bradley Hercules mills manufactured by the Bradley Pulverizer Company are used quite generally by the cement mills of the Pacific Coast. The Superior Portland Cement Company at Concrete, Washington, and also the Riverside Portland Cement Company of Los Angeles, California, are both using Hercules mills on both the raw and finished end.

The Superior Portland Cement Company are using a Bradley Hercules mill as a pulverizer on wet materials while the Riverside Portland Cement Company pulverize dry materials. Both plants use the Bradley mill for pulverizing cement clinker.

Flory Cableways

S. Flory Manufacturing Company have installed cableway plants all over the world. Spans may be up to 2,500 feet in length, single loads up to 20 tons and operating speeds often are arranged up to 1,200 feet per minute. Materials may be handled in skips, closed buckets, slings or grab buckets where excavation or the self filling and dumping of materials is required. Plants are operated by steam, electric, gasoline or belt power. Some have been driven direct by the power of a water turbine.

Materials may be picked up and conveyed and dumped at any point vertically or laterally between the head and tail towers. Aerial dumping is often accomplished, all controlled by the operator at the hoist.

A notable installation in the far west is a cableway installed at the plant of the Santa Cruz Portland Cement Company, Davenport, California. This plant was installed in 1907 for handling clinker storage. It has a span of 1,200 feet between towers, which are stationary and handles skips of 25 barrels capacity. Skips are filled from chutes under the coolers and conveyed to ground storage over an area 1,200 feet long, 200 feet wide and nearly 100 feet high, providing a capacity of about one million barrels. Towers are 160 feet high. The plant is electrically operated. Although the equipment was installed nearly twenty years ago, it is still "operating very satisfactorily."

Gayco Separators

The Rubert M. Gay Company, Inc., manufacturers of the well-known Gayco Separators report that they have quite a number of installations in the West and on the Pacific Coast, one of these is the Pacific Portland Cement Company, Consolidated, of Redwood City, California, who have two 14 foot separators; another is the Non-Metallic Minerals Company of Los Angeles; The Standard Sanitary Manufacturing Company at Richmond, California, have a 14 foot machine and have recently ordered another similar machine for their new plant at Campo, California. Still another Gayco is at the plant of the Mt. Shasta Power Corporation at Bartle, California. These machines are handling cement clinker, feldspar and various non-metallic minerals.

Haiss Truck Loaders

The George Haiss Manufacturing Company are well represented on the Pacific Coast with installations of the Haiss truck loaders. Some of the users are:

Oregon Portland Cement Company, Portland, Oregon.

National Rock and Gravel Company, Inc., Los Angeles, California.

Oakland Paving Company, Oakland, California.

The Griffith Company, Los Angeles, California.

Saticoy Rock Company, Saticoy, California.

Co-operative Sand and Gravel Company, Hollywood, California.

B. R. Ford Contracting Company, Santa Ana, California.

Edward Sidebotham and Sons, Limita, California.

Oswald Brothers, Los Angeles, California.

Hardinge Company

The Hardinge Company have a notable installation of one of their mills in the Santa Cruz Portland Cement Company which figured prominently in the increase of the plant capacity.

Interstate Aerial Tramways

The Interstate Equipment Corporation have made some noteworthy installations recently in the West.

Basalt Rock Company, Napa, California:

Two tramways. The first installation, 3,400 feet long from quarry to screening plant and bunkers, handles run of crushed stone. The later installation, 6,200 feet long delivers screened stone from bunkers to railroad siding and barge terminal. Each line is operated by electric motor. The present capacity is 90 tons per hour and the design provides for an ultimate capacity of 140 tons per hour.

Blue Diamond Materials Company, Arden, Nevada:

Located in the heart of the desert 30 miles from Las Vegas, this tramway carries gypsum 3,600 feet from a mountain top to railroad twelve hundred feet below, over the roughest country. Capacity 80 tons per hour of crushed gypsum. The excess power developed by gravity is used to assist the oil engine in operating crushers and other machinery by means of belt connection with main countershaft of the plant at loading terminal.

Celite Company, Lompoc, California:

A line 1,370 feet long for transporting crushed diatomaceous earth from quarry to mill. An unusual installation in that the material to be handled is very light, therefore, requiring large volume cars to give the required capacity of 40 tons per hour. Operated by electric motor.

Nephi Plaster and Manufacturing Company, Nephi, Utah:

Another gypsum line 8,760 feet long taking material from bunkers at

quarry to bins at the mill. Designed for ultimate capacity of 50 tons per hour. Operated by electric motor.
Western Smelting and Power Company, Cooke, Montana:

Line 9,500 feet long, for carrying copper ore from mine shaft to smelter 700 feet below. Designed capacity 156 tons per hour. Gravity operated with electric motor.

Each of the above lines requires but one man to operate. Four wheeled carriers permanently attached to an ever moving haul rope, take their load while in motion by tripping an automatic loader at the loading terminal and deliver automatically at discharge terminal.

Leahy Screens

The Deister Concentrator Company have installed their Leahy screens in many plants along the Pacific Coast. The following plants is a list of the leading installations:

International Wood and Sulphite Company, Stanwood, Washington.

State of Washington, Spokane, Washington.

Hawthorne Dock Company, Portland, Oregon.

American Crushed Stone Company (Union Rock Company) Montello, California.

G. and M. Concrete Company, Livermore, California.

Marysville Sand Company, Marysville, California.

Kaiser Paving Company, Oakland, California.

Oakland Paving Company, Oakland, California.

Haines Canyon Rock Company, La Crescenta, California.

Consolidated Salt Company, Los Angeles, California.

Morris Pumps

The Morris Machine Works have installed many pumps in various types of plants in the Pacific Coast states. One of the most recent installations is a 15 inch dredging pump connected to a 13 and 26 by 14 compound engine for the Port of Coos Bay at Marshfield, Oregon. Another was a 15 inch dredging directly connected to a 350 h.p. motor for the Long Bell Lumber Company at Kelso, Washington. The United States Engineers office at Portland are using several 8, 10 and 12 inch Morris dredging pumps in work around Portland.

P. & H. Products

The Harnischfeger Corporation have installed their P. and H. shovels and cranes in some of the most important plants. Some of these on the Pacific Coast are:

Riverbank Sand Company, San Francisco, ¾ cubic yard dragline-drop.

Orange County Rock Company, Orange, ¾ yard shovel, ¾ yard dragline.

Standard Gypsum Company, San Francisco, ¾ yard shovel, ½ yard shovel.

San Jose Sand and Gravel Company, San Jose, ¾ yard shovel, ½ yard clam, skimmer.

George Pollock Company, Sacramento, 1¼ yard shovel, ¾ yard shovel.

F. W. Camp, San Francisco, ½ yard dragline.

Clay Corporation of California, Lincoln, ¾ yard shovel.

Southwestern Portland Cement Company, Los Angeles, overhead electric cranes.

Pacific Portland Cement Company, San Francisco, Grab Bucket Crane.

Enwood Sand and Rock Company, Roseville, ¾ yard dragline, ½ yard dragline.

Lincoln Clay Products, Lincoln, ½ yard shovel.

Consumers Rock and Gravel Company, Los Angeles, ¾ yard shovel.

Orange County Rock and Gravel Company, Orange, ¾ yard shovel, ¾ yard dragline.

Preston Rock and Crusher Company, Lamanda Park, ¾ yard shovel.

Gladding and McBean, San Francisco, ¾ yard shovel.

Rolman Screens

The Manganese Steel Forge Company have installed many of their Rolman double lock mesh woven manganese steel screens on the Pacific Coast. The following list of plants is a representative list of such installations:

Atlas Rock Company (Oakdale Plant) Stockton, California.

Blake Brothers Company, Richmond, California.

Blue Diamond Company, Corona, California.

City of Pasadena Rock Crusher, Pasadena, California.

Heney Sand and Gravel Company, Seattle, Washington.

Los Gatos Sand and Gravel Company, Los Gatos, California.

Mountain Copper Company, Ltd., Matheson, Shasta County, California.

Pioneer Sand and Gravel Company, Seattle, Washington and Victoria, B. C.

Santa Cruz Portland Cement Company, Davenport, California.

Service Rock Company, Rockhaven, California.

Western Building Materials Company, Sacramento, California.

The Manganese Steel Forge Company announce the opening of a new office at 320 South San Pedro Street, Los Angeles, California. Eccles and Davies Machinery Company, Inc., of this address will handle the complete line of Rolman rolled and forged manganese steel products in the state of California.

Stephens-Adamson

Belt conveyors, elevators, screens, etc., manufactured by the Stephens Adamson Manufacturing Company are installed in many sand and gravel, crushed stone, cement, lime and gypsum plants along the Pacific Coast. The following is a partial list of those in California:

Consumers Rock and Gravel Company, Los Angeles, Hewitt, Roscoe and Tejunga; Santa Catalina Island Company, Catalina Island; Orange County Rock and Gravel Company, Orange and Frink; Saticoy Rock and Gravel Company, Saticoy; Eaton Canyon Sand and Gravel Company, Pasadena; Union Rock Company, (Boulevard Plant) San Fernando; Blue Diamond Materials Company, Corona; Yaeger Rock Company, Orange; A-1 Sand and Gravel Company, Los Angeles; Fenton Parker Materials Company, San Diego; National Rock Company, Los Angeles; Niles Sand & Gravel Company, Niles; Orange County Rock Company, Orange; Pacific Rock Company, San Fernando; Saticoy Rock Company, Saticoy; Schweitzer Brothers, Los Angeles; George Simpson Company, Los Angeles; Star Sand and Gravel Company, San Fernando; Triangle Rock Company, San Fernando; Blue Diamond Materials Company, Los Angeles; Boulevard Rock and Gravel Company, San Fernando; Coast Rock and Gravel Company, San Francisco; Crystal Chemical Company, Anaheim; Cudahy Packing Company, Los Angeles; Globe Cotton Oil Company, Los Angeles; Good Roads Machinery Company, Los Angeles; Gordon, Harrison, Russell, Los Angeles; Granite Rock Company, Watsonville; California Portland Cement Company, Colton; Riverside Portland Cement Company, Crestmore; Oro Grande Portland Cement Company, Oro Grande; Southwestern Portland Cement Company, Victorville; Santa Cruz Portland Cement Company, Santa Cruz; Pacific Portland Cement Company, San Francisco.

St. Paul Hydraulic Hoists

The Hydraulic Hoist Manufacturing Company have many installations of the St. Paul vertical and underbody hoists on the Pacific Coast. The following is a partial list:

California

Simons Brick Company, Los Angeles.

The Blue Diamond Materials Company, Los Angeles.

Robert Griffith Company, Los Angeles.

The Orange County Rock & Gravel Co., Orange.

Yaeger Rock & Gravel Co., Fullerton.

Livingston and Sons, Alhambra.

Hill and Houser, Whittier.

The T. L. Barris Company, San Francisco.

Granfield Farrar and Carlin, San Francisco.

H. A. Albach Company, San Francisco.

H. V. Tucker, San Francisco.

The San Mateo Feed & Fuel Company, San Mateo.

H. E. Casey Company, San Mateo.

Raymond and Vanderwright, Oakland.

W. C. Colly, Oakland.

Canevari Brothers, Santa Rosa.

Washington

E. L. Ray, Seattle.

E. S. Bishop, Seattle.

Seattle Garbage and Hauling Co., Seattle.

Bert Navone, Seattle.

H. O. Sieffert Company, Everett.

Washington State Highway Department, Olympia.

Gordon Remnsnider, Tacoma.

E. T. Peters, Tacoma.

Caine-Grimshaw, Bellingham.

Grays Harbor County.

King County.

Snohomish County.

J. L. Rumsey. Anacortis.

Oregon

Taylor Brothers & Pacquet Company, Portland.

Henry Foote, Portland.

Telsmith Installations

The Smith Engineering Works have a great many installations on the Pacific Coast. Among the larger Telsmith plants in California are the following:

Basalt Rock Company, Napa.

Granite Rock Company, Watsonville.

California Rock Company, Pleasanton.

Fenton Materials Company, San Diego.

Orange County Rock Company, McPherson.

Hein Brothers, Napa.

Catalina Company, Avalon.

Pratt Sand and Gravel Company, San Francisco.

Santa Clara Gravel Company, Campbell.

Kaiser Paving Company, Redding.

The Harnischfeger Corporation announces that Mr. L. N. Ridenour, formally with Wellman, Seaver, Morgan Company, and later agent for Contractor's Equipment in Cleveland, has been appointed special factory representative.

New Incorporations

American Slate Co., Caddo Gap, Ark. Roy and Bert Buckley, owners of American Cornice Works, Wichita, Kas. $50,000.

Cumberland Sand & Gravel Co., Wilmington, Dela. $50,000.

National Rock Asphalt Co., Wilmington, Dela. A. L. Miller. $5,000,000. (Corp. Trust Co. of America).

Pioneer Crushed Stone Co., 708 W. McDonough St., Joliet, Ill. C. L. Hermes, J. H. Sharp, F. A. Prehn. $15,000.

Tennessee Crushed Rock Co., Knoxville, Ill. C. C. Benner, H. M. Rhinehart, Charles McMillan.

Atlas Kentucky Rock Co., Coleman Taylor, Russellville, Ky. To mine and deal in rock asphalt. $1,000,000.

New Orleans Gravel Co. W. A. Bisso, 123 Walnut St., New Orleans, La. $15,000.

Jansen-Kelly Co., 2301 Eastern Ave. S. E., Grand Rapids, Mich. To operate gravel pit and manufacture sand and gravel products. John Jansen, Pres., 160 Alger St. S. E.; Thomas F. Kelly, Sec'y.-Treas., 500 Union Ave. S. E. $10,000.

St. Joseph Marble & Granite Works, Ship St., St. Joseph, Mich. Charles L. Peapples, Pres.; Mrs. Emma C. Ferguson, V. P.; Mrs. Millie E. Peapples, Sec'y.; Victor E. Ferguson, Treas. $12,000.

Advance Stone Works, New York City. A. Fasini, J. F. Sabbia. $50,000. (Corr., D. Epstein, 299 Broadway, New York City.)

Union Sand & Gravel Co., Charleston, O., R. D. Freedom Station, O. J. F. Fratzker, G. B. Shade, G. C. Champagne. $25,000.

Cleveland Sand & Gravel Co., Cleveland, O. N. J. Dobkins, D. D. Santo, N. B. Carmosino. $10,000.

Mound Street Gravel Co., Columbus, O. H. R. Gill, C. P. McClelland, C. O. Rhoads, G. E. Murphy. 2,000 shares of $100 par and 4,000 shares of common no par.

Texas Quarry Co., McAllester, Okla. $100,000. (U. S. Corp. Co.).

Hilton Gravel Corp., Houston, Tex. F. L. Overton, Emil Schmdit, R. E. Watters. $30,000.

Fairmount Limestone & Sand Co., Charleston, W. Va. E. N. Eddy, G. R. Morgan, W. A. Lawler, Farmont, W. Va. $30,000.

Blue Lake Sand & Gravel, Ltd., Toronto, Ont., Can. To open and manage gravel pits, handle stone, etc. James and Leonard Franceschini, Charles Johnston. $50,000.

Northwestern Limestone Co., Wilson, St. Croix Co., Wis. $50,000. 500 sh. par $100. Quarrying and crushing rock, manufacturing lime and lime products. E. H. Schultz, Mrs. Carrie Schultz, both of Wilson, Wis.; E. C. Quilling, Menomonie, Wis. Filed by C. R. Freeman, Att'y, Menomonie, Wis. (Have been operating for some time.)

Wisconsin Lannon Stone Co., Milwaukee, Wis. 1500 shares (1000 sh. common par $100 and 500 sh. pft. par $100). Quarrying and preparing stone, general building and construction business. H. Schattschneider, H. E. Panetti, H. K. Curtis. Filed by McGovern, Lyons, Curtis, Devos & Reiss, Att'ys, Milwaukee, Wis.

Lumber City Sand Co., Box 244, Brunswick, Ga. $10,000. J. Hunter Hopkins, Pres.-Sec. Developing sand deposits; daily output 5 or 6 cars; machinery installed. (Have been operating at Lumber City, Ga., for several years.)

Delaware Marble and Mining Co., Wilmington, Del., acquire lands, $200,000. (Colonial Charter Co.)

Roa-Hook Sand & Gravel Co., Elizabeth, N. J. $100,000. Mary A. Depew, Lindan; Alfred F. Sauer, Robert A. Sauer. (Att'y, Frank K. Sauer, Elizabeth.)

Tennessee Slate Products Co., Maryville, Tenn. $300,000. James L. Cawthron, W. P. Hood, Nealy Morton, John M. Clark, J. O. Law, R. R. Kramer, all of Maryville; Robert L. Golthrop, Vonore, Monroe Co., Tenn.; F. J. Bates, Asheville, N. C.; L. V. Thayer, New York City.

Allen Marble Works, Camden, Ark. $35,000. J. S. Allen, Pres.; W. P. Allen, V. P. and Treas.; J. M. Batchelor, Sec.; M. U. Allen; L. L. Allen. Will begin operations immediately.

Metzger Lumber and Material Co., Gary, Ind. (General building supply yard). Capital, $21,000. Directors: Roy Metzger, Xen McNair, Ora L. Wildermuth.

Hyatt Conveyor Folders

The Hyatt Roller Bearing Company has recently published the first of four folders describing the application of their roller bearings to conveyor and elevator installations. This folder is illustrated with half tones showing seven typical applications of these roller bearings to belt conveyors, speed reducers, air tramways, carburizer handling systems, elevators, and parcel post terminals. One of the bearings partly disassembled is also shown and text describes the fundamental features used in their design in order to obtain continuous performance which is the feature noted in this first folder. Other folders will follow to complete the set in which other features will be discussed. The company writes that suggestions, criticism and inquiries are desired and will receive careful and prompt attention.

Portland cement shipped from mills into States, in June and July, 1925 and 1926, in barrels*

Shipped to—	June		July	
	1925	1926	1925	1926
Alabama	214,195	215,892	256,741	184,577
Alaska	1,284	1,130	2,816	1,386
Arizona	32,451	46,262	37,842	35,817
Arkansas	92,101	66,835	78,059	73,292
California	1,066,088	1,187,724	1,061,048	1,173,099
Colorado	120,818	124,451	118,272	117,990
Connecticut	172,564	206,301	176,644	218,375
Delaware	37,330	45,642	43,326	38,228
District of Columbia	81,334	86,218	82,133	94,852
Florida	348,330	297,204	341,849	284,281
Georgia	129,748	174,488	132,050	213,432
Hawaii	6,108	14,360	993	12,761
Idaho	28,122	54,424	28,498	47,991
Illinois	1,636,329	1,854,806	1,853,734	1,857,890
Indiana	617,360	635,118	658,042	696,653
Iowa	310,558	329,422	327,155	353,529
Kansas	233,522	247,335	226,787	230,022
Kentucky	231,491	176,187	229,652	198,902
Louisiana	100,016	106,338	99,111	112,958
Maine	43,541	66,264	41,475	67,475
Maryland	249,105	244,763	247,835	221,600
Massachusetts	350,620	338,079	386,058	331,320
Michigan	1,264,462	1,469,758	1,229,598	1,505,905
Minnesota	409,235	526,695	436,453	475,846
Mississippi	66,012	73,345	67,446	89,752
Missouri	583,561	631,184	683,097	653,615
Montana	28,904	23,114	31,486	38,749
Nebraska	181,516	187,780	203,863	172,489
Nevada	10,784	9,895	10,068	7,878
New Hampshire	40,837	48,285	41,843	55,233
New Jersey	737,572	773,450	760,944	793,625
New Mexico	18,406	16,222	16,323	14,736
New York	2,090,644	2,475,868	2,170,960	2,336,788
North Carolina	324,201	420,248	343,683	396,618
North Dakota	66,089	75,470	55,305	62,581
Ohio	1,099,767	1,310,691	1,099,016	1,247,338
Oklahoma	225,879	219,946	225,729	205,345
Oregon	134,038	150,962	143,672	151,296
Pennsylvania	1,869,299	1,697,387	1,869,377	1,618,569
Porto Rico	0	0	0	0
Rhode Island	89,213	80,912	75,383	65,525
South Carolina	85,087	47,279	75,376	53,506
South Dakota	59,120	53,091	55,487	46,987
Tennessee	185,536	206,917	208,562	213,058
Texas	411,795	447,231	418,401	481,008
Utah	37,733	66,883	38,975	50,306
Vermont	26,978	32,291	26,245	38,607
Virginia	172,760	211,665	180,025	180,085
Washington	328,589	260,756	334,466	239,146
West Virginia	161,484	208,308	164,874	214,901
Wisconsin	569,687	691,934	562,363	704,770
Wyoming	31,290	20,331	25,691	19,973
Unspecified	3,996	81,004	48,647	774
	17,417,489	19,038,145	18,033,478	18,701,439
Foreign Countries	83,511	74,855	97,522	84,561
Total shipped from cement plants	17,501,000	19,113,000	18,131,000	†18,786,000

*Includes estimated distribution of shipments from three plants in June, 1926, and July, 1925, and from four plants in June, 1925, and July, 1926. †Revised.

Production, shipments, and stocks of finished Portland cement, by districts in August, 1925 and 1926, and stocks in July, 1926, in barrels

Commercial District	Production August		Shipments August		Stocks at end of August		Stocks at end of July, 1926*
	1925	1926	1925	1926	1925	1926	
Eastern Pa., N. J. & Md.	3,726,000	3,901,000	4,402,000	4,212,000	1,784,000	3,376,000	3,687,000
New York	867,000	936,000	1,001,000	1,086,000	623,000	842,000	992,000
Ohio, Western Pa. & W. Va.	1,810,000	1,757,000	1,905,000	1,843,000	1,517,000	1,932,000	2,017,000
Michigan	1,192,000	1,508,000	1,285,000	1,806,000	873,000	1,261,000	1,558,000
Wis., Ill. Ind. & Ky.	2,425,000	2,422,000	2,914,000	2,896,000	2,122,000	1,906,000	2,381,000
Va., Tenn., Ala. & Ga.	1,302,000	1,366,000	1,263,000	1,427,000	314,000	1,089,000	1,150,000
Eastern Mo., Ia., Minn. & So. Dak.	1,632,000	1,561,000	1,952,000	1,720,000	2,080,000	2,078,000	2,237,000
West. Mo., Neb., Kans. & Okla.	1,170,000	1,162,000	1,268,000	1,192,000	1,430,000	1,331,000	1,361,000
Texas	481,000	440,000	452,000	494,000	262,000	418,000	472,000
Colo., Mont. & Utah	239,000	309,000	263,000	297,000	409,000	425,000	413,000
California	1,181,000	1,248,000	1,234,000	1,258,000	391,000	518,000	529,000
Oregon & Wash.	394,000	326,000	444,000	305,000	147,000	434,000	413,000
	16,419,000	16,936,000	18,383,000	18,536,000	11,952,000	15,610,000	17,210,000

*Revised.

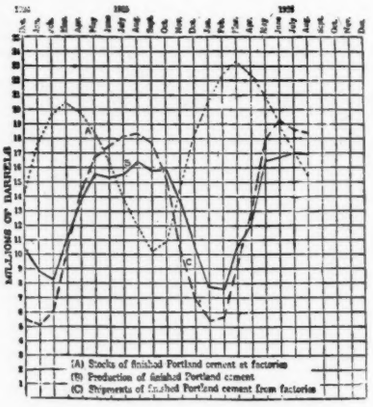
Estimated clinker (unground cement) at the mills at end of each month, 1925 and 1926, in barrels

Month	1925	1926	Month	1925	1926
January	7,017,000	9,074,000	July	6,961,000	*8,515,000
February	9,497,000	10,931,000	August	5,640,000	7,270,000
March	9,962,000	12,284,000	September	4,561,000	.....
April	9,731,000	12,934,000	October	4,086,000	.....
May	9,053,000	11,649,000	November	5,013,000	.....
June	7,937,000	10,086,000	December	6,469,000	.....

*Revised.

Portland Cement Statistics for August

August production and shipments of Portland cement were the greatest for that month in any year, according to the Bureau of Mines, Department of Commerce. Production of Portland cement was exceeded only by that of July, 1926, while shipments were exceeded only in the two preceding months. Portland cement stocks continued to decline but at the end of August were nearly 31 per cent higher than on August 31, 1925. These statistics, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are compiled from reports for August, 1926, received direct from all manufacturing plants except three, for which estimates were necessary on account of lack of returns.


MILLIONS OF BARRELS
(A) Stocks of finished Portland cement at factories
(B) Production of finished Portland cement
(C) Shipments of finished Portland cement from factories

Beaumont Skip Lifts

An easy and simple way to elevate materials such as sand, gravel, stone and other granular materials, has been made possible by the recent development and perfection of the Beaumont skip lift, a product of the R. H. Beaumont Company, and described in bulletin number 79, recently issued by them. The skip lift consists of a bucket, guides, cable and electrically operated winding machine.

Two distinct applications can be made with the skip-lift—one where the elevating is adjacent to a building, the guides being supported by the building wall; the other where the elevating is in isolated locations and the skip lift is of a self-supporting type. Three methods of operation are possible with the skip-lift—full automatic, semi-automatic and manual.

The full automatic type does not require an attendant, except to press a button to start and stop the machine. When material is to be elevated, the attendant pushes a button to start the skip. When the button is pressed, the bucket descends to the pit where it engages with the simplex loader, receives its load of material and ascends, discharges, descends, reloads and continues this cycle of opera-

tion as long as material is to be handled. Then the attendant, by pushing a stop button halts the bucket wherever it may be along the path. The simplex automatic loader, used in connection with the automatic skip-lift, is not dependent on electrical timing devices for operation. It is opened and closed only by contact with the skip bucket. In decending into the pit, the bucket engages with a hook on the loader pulling the loader down into an open position permitting material to pass into the bucket. Being of the self-damming type, the loader passes full loads of material at each opening, yet prevents flooding and underloading of the bucket. As the bucket ascends, it pushes the loader into an upright and closed position, counterweights on the loader assist in closing and keep it closed.

The second type is semi-automatic. This is the type generally used for handling ashes and similar service requiring intermittent duty. Here the workman loads the bucket by means of small cars, wheelbarrows, etc., and when the bucket is loaded presses a button to elevate it; the bucket ascends, discharges, descends and comes to rest in the pit ready for another load. The operation of this type of skip-lift is automatic except that it only makes one cycle and stops in the pit after each trip.

The third type is manually operated. One man is required to both load and control the skip-lift of this type. When material in the pit is to be elevated, he loads the bucket by pulling a lever, which opens the unloading gate and permits material in the pit to pass into the bucket. When the bucket is full, he reverses the throw on the lever closing the gate, then by operating a controller, starts the skip bucket elevating, and, as the bucket reaches the discharge position, he stops it. After material is discharged from the bucket, he reverses the controller, lowering the bucket to the pit and again stops it for reloading . The loader used with the manually operated skip-lift consists of a vertical undercut slide gate made of steel plate and runs in cast iron guides. It is operated by means of a lever located above the pit in a position where the operator has a clear view of the bucket filling. This loader is easy to operate and positive in its action. The winding machine is the only piece of machinery used in connection with the skip-lift. This is always placed in a position remote from dirt and grit and so located that it is readily accessible for oiling, etc.

The skip lift is a radical departure from former methods used in elevating bulk materials.

Production, shipments, and stocks of finished Portland cement, by months, in 1925 and 1926

Month	Production		Shipments		Stocks at end of month	
	1925	1926	1925	1926	1925	1926
January	8,856,000	7,887,000	5,162,000	5,672,000	17,656,000	20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,689,000	22,384,000
March	11,034,000	10,355,000	10,279,000	9,539,000	20,469,000	23,200,000
1st quarter	28,145,000	25,973,000	21,456,000	21,031,000	.....	.....
April	13,807,000	12,401,000	14,394,000	12,961,000	19,877,000	22,640,000
May	15,503,000	16,472,000	16,735,000	17,951,000	18,440,000	21,173,000
June	15,387,000	16,827,000	17,501,000	19,113,000	16,409,000	18,900,000
2nd quarter	44,697,000	45,700,000	48,630,000	50,025,000	.....	.....
July	15,641,000	*17,096,000	18,131,000	*18,786,000	13,896,000	*17,210,000
August	16,419,000	16,936,000	18,383,000	18,536,000	11,952,000	15,610,000
September	15,939,000	.....	17,711,000	.....	10,247,000	.....
3rd quarter	47,999,000	.....	54,225,000	.....	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	10,713,000	.....	6,917,000	.....	18,365,000	.....
4th quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

*Revised.

EXPORTS AND IMPORTS*

Exports of hydraulic cement by countries, in July, 1926

	Barrels	Value
Canada	1,677	$ 7,264
Central America	5,573	14,512
Cuba	15,935	38,940
Other West Indies	6,697	14,485
Mexico	17,646	48,877
South America	77,955	216,563
Other countries	5,339	29,579
	130,822	$370,220

Imports of hydraulic cement by countries, and by districts, in June, 1926

Imported from—	District into which imported—	Barrels	Value
Belgium	Connecticut	8,448	$ 13,479
	Galveston	2,240	2,994
	Hawaii	12,499	17,765
	Los Angeles	3,050	3,634
	Maine and New England	5,999	12,480
	Massachusetts	33,171	50,773
	Mobile	17,360	29,022
	New Orleans	18,730	26,722
	Oregon	14,697	20,649
	Philadelphia	31,443	50,135
	Porto Rico	2,991	4,597
	Washington	13,124	21,370
	Total	163,752	$253,621
Canada	Maine and New Hampshire	226	1,109
	St. Lawrence	930	1,995
	Vermont	369	645
	Total	1,525	$ 3,749
Denmark and Faroe Islands	Porto Rico	25,158	36,249
Esthonia	Florida	25,617	36,510
France	Massachusetts	11,629	18,977
Germany	Michigan	54	77
Japan	Hawaii	2,997	5,776
Soviet Russia in Europe	New York	20,130	41,016
United Kingdom	New York	.....	6
	Grand total	250,862	$395,981

Exports and imports of hydraulic cement, by months, in 1925 and 1926

Month	Exports				Imports			
	1925		1926		1925		1926	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	71,596	$ 207,547	72,939	$216,431	231,258	$ 364,196	360,580	$576,717
February	56,249	181,356	73,975	220,706	119,077	206,308	314,118	527,948
March	65,248	200,410	69,080	205,647	218,048	337,039	493,241	812,968
April	89,508	263,831	96,296	284,772	197,686	280,826	257,302	398,114
May	85,385	250,845	78,601	224,365	186,897	286,959	223,130	337,031
June	71,343	217,899	80,684	248,814	254,937	409,539	335,570	495,744
July	98,141	286,543	130,822	370,220	335,118	499,602	250,862	395,981
August	103,962	289,904	.....	.....	379,847	611,551	.....	.....
September	102,649	285,225	.....	.....	513,252	789,121	.....	.....
October	73,369	228,467	.....	.....	535,050	824,268	.....	.....
November	101,825	294,201	.....	.....	388,604	678,518	.....	.....
December	100,323	296,900	.....	.....	295,543	526,001	.....	.....
	1,019,697	$3,003,128	.....	.....	3,655,317	$5,813,928	.....	.....

Domestic hydraulic cement shipped to Alaska, Hawaii, and Porto Rico, in July, 1926*

	Barrels	Value
Alaska	1,084	$ 3,273
Hawaii	12,796	32,006
Porto Rico	8,801	16,556
	22,681	$ 51,835

*Compiled from the records of the Bureau of Foreign and Domestic Commerce and subject to revision.

Recent Patents

The following patents of interest to readers of this journal recently were issued from the United States Patent Office. Copies thereof may be obtained from R. E. Burnham, patent and trade-mark attorney, Continental Trust Building, Washington, D. C., at the rate of 20c each. State number of patent and name of inventor when ordering.

1,596,127. Excavating-machine. James T. Thomas, Bradyville, Tenn.

1,596,386. Mining-machine. Charles W. Wyman, Claremont, N. H., assignor to Sullivan Machinery Co., same place.

1,596,428. Drier and separator for sand and the like. Fred E. Greene, Oakland, Cal.

1,596,435. Mining apparatus. Morris P. Holmes, Claremont, N. H., assignor to Sullivan Machinery Co., same place.

1,596,759. Concrete cribbing. George E. Nagel, Greenville, Ohio.

1,596,056. Apparatus for cement manufacture and process for operating the same. Edmund G. Weeks, Northumberland, England, assignor to Merz & McLellan, Westminster, London, England.

1,597,005. Mining apparatus. Edwin Ball, Birmingham, and Clarence E. Abbott, Bessemer, Ala.

1,597,006. Cement-packer bag-support. Adelmer M. Bates and Thomas H. Cosford, Chicago, Ill., assignors to Bates Valve Bag Co., same place.

1,597,103. Process of making artificial marble and product made thereby. Hynek Oberherr, Prague, Czechoslovakia.

1,597,197. Building construction. Jefferson D. Pace, Alexandria, La., assignor to National Reinforced Concrete Slab Co., same place.

1,597,173. Screening device. Charles E. Barhight, Carbondale, Pa., assignor to Cross Engineering Co.

1,597,207. Rock-crusher. Alfred Molander, St. Paul, Minn.

1,597,220. Process and apparatus for making concrete pipe. Oscar Tuerck and William J. MacKenzie, Portland, Ore., assignor to Tuerck-MacKenzie Co., same place.

1,597,278. Composite-beam construction. Julius Kahn, Youngstown, Ohio, assignor to Truscon Steel Co., same place.

1,597,318. Building construction. Thomas H. Kane, Youngstown, Ohio, assignor to Truscon Steel Co., same place.

1,597,745. Mechanism for power shovels and cranes. Charles A. Weber, Lorain, Ohio, assignor to Thew Shovel Co., same place.

1,597,923. Mining-machine. Richard Peale, St. Benedict, Pa., assignor to Rembrandt Peale, same place.

1,598,029. Excavating machinery. George W. Umstead, Upper Sandusky, Ohio.

1,598,105. Flitting-truck or trolley for coal-cutting machines. Gilbert Rimmer, London, England, assignor to Sullivan Machinery Co., Claremont, N. H.

1,598,131. Method and apparatus for constructing concrete walls. William D. Ham, Washington, D. C., assignor to Ham's Method Engineering Co., same place.

1,598,132. Ornamenting concrete walls. William D. Ham, Washington, D. C., assignor to Ham's Method Engineering Co., same place.

1,598,542. Gravel-washing apparatus. Lewis E. Smoot, Washington, D. C., assignor to Smoot Sand & Gravel Corporation, same place.

1,598,700. Building slab or tile of concrete, clay, or like substances. Leroy Baumgartl, Hubbard Woods, Ill., assignor to Federal Cement Tile Co., Chicago, Ill.

1,598,723. Adjustable boom structure. Grant Holmes, Danville, Ill., assignor to Marion Steam Shovel Co., Marion, Ohio.

1,598,933. Pulverizing-mill. Alexander M. Reed, Columbus, Ohio.

1,598,945. Excavator. Ralph Volk, Bellingham, Wash.

1,599,035. Knockdown form for molding concrete. Walter E. Baumberger, San Francisco, Cal.

1,599,043. Mining-machine. Edward J. Doberstein, Blue Island, Ill., assignor to Goodman Mfg. Co., Chicago, Ill.

New Electric Apparatus

Allen-Bradley Company has recently developed electric controlling apparatus described and illustrated in bulletins 600, 710 and 740. These devices consist of across-the-line starting switches for squirrel cage polyphase motors, self starting polyphase motors, primary control of slip ring motors and self starting single ring motors. These switches are made for any of these types of motors with various horse power, volts and amperes.

Semi-Automatic slip ring motor starters for two or three phase slip ring motors from 5 to 100 h.p. and voltages of 220, 440 and 550. Direct current contractors for remote control of motor currents, lighting currents, electric ovens, battery charging circuits and various types of special control panels. These contractors have been designed for one or two pole, 30 to 1,000 amperes and 115, 230 and 500 volts. Automatic resistance starters for squirrel cage motors either single, two or three phase. These starters are being manufactured from 1 to 60 h.p. and for 110, 220, 440 and 550 volts.

Air Filter Development

Developments recently announced by the Staynew Filter Corporation, a manufacturer of automotive air filters, have focussed attention on new refinements in this vitally necessary automotive protective device.

The Protectomotor Air Filter owes its pioneer distinction to the fact that it actually filters the air which enters the carburetor through a specially prepared filter medium. This efficient protection against the admittance of abrasive road dust is virtually foolproof in its use on all types of pleasure cars and trucks. However, it is now made even more effective by the addition of an ingenious cleaning device which insures even greater simplicity of operation.

The illustration shows the construction of the Protectomotor High Efficiency Air Filter and the unique new cleaning device. The retaining bolt which secures the felt filter medium is now made in tubular form and pierced with holes for cleaning out by an air blast. The top of the bolt is arranged to receive an ordinary free air hose. About once every three months this hose should be applied to the top of the bolt, which is revolved as the air blast is driven through it, and the dust collected on the outer surface of the felt is completely blown off, leaving the large area of the filter medium absolutely clean and unrestricted. Each individual fin of the felt filter medium is exposed to the full force of the compressed air.

Columbus McKinnon Men Hold Convention

At Tonawanda, New York, on August 25th to 28th inclusive the Columbus McKinnon Chain Company held a joint convention of the sales departments of the Industrial Chain Division and the Automotive Department.

The entire sales policies of both divisions were reviewed, new merchandising ideas were presented and discussed under the chairmanship of Don S. Brisbin, General Sales Manager and Warren J. Shay, Sales Manager of the Automotive Division. Julius F. Stone, president of the company and A. R. Markel were in attendance from Columbus. One of the features of the convention was the free and enthusiastic interchange of ideas between all present, officers of the company and salemen alike.

The policy of the production department was forcefully expressed by G. J. Armstrong of the Tonawanda plant in the following words: "To make the products of the company fit the market rather than trying to make the market fit the merchandise."